

RFC Rhine-Alpine Re-Routing Scenarios



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1 General information

1.1. Introduction

Large incidents like Rastatt show that international measures must be implemented to be able to quickly organize traffic after a major interruption. European Rail Infrastructure Managers (IMs) agreed on international processes described in the “Handbook for International Contingency Management” ([click here](#)). An important new element is an international collection of re-routing scenarios for the Rail Freight Corridors (RFC).

These re-routing scenarios help traffic management and timetabling with the coordination of the deviation of freight trains in the plannable phase (as soon as possible after an incident) in case of larger incidents with an international impact.

This document includes scenarios with the possible re-routing options for all sections with limited re-routing options on RFC Rhine-Alpine.

Railway Undertakings (RUs) are consulted on the initial re-routing scenarios and asked to give information on restrictions from their point of view. The feedback is not part of this document. The re-routing scenarios shall also serve as a basis for the RU contingency management with the objective to increase possible use of deviation routes.

1.2. Publication and updates

The national IMs are responsible to distribute this document or the contained information with the re-routing scenarios within their own organisation and to the RUs which run on their network. RFC Rhine-Alpine also publishes the document on its website and organises the consultation with RUs.

The re-routing scenarios for RFC Rhine-Alpine are updated every year until the end of November by the corridor organisation together with the IMs of RFC Rhine-Alpine.

1.3. Processes and communication for international disruptions

In case of international disruptions, international processes for incident management and incident communication which shall apply during the plannable phase are described in chapter 4 of the Handbook for International Contingency Management. They do not replace national incident management procedures but complement them in order to facilitate a better international cooperation.

1.4. General requirements

RUs crossing a border must take all national rules into account (see network statement). For example: language requirements for the train drivers, other signalling and power systems.

1.5. Definitions

1.5.1. Definitions of infrastructure parameters

These definitions apply to information given in both re-routing scenarios (separate excel document).

Term	Definition
Line section	Section of the normal RFC routing
Deviation including route	Section which replaces the normal routing on the deviation route
Passengers	Section used for passenger traffic
Freight	Section used for freight traffic
Traction power	Catenary voltage / In B also a standard thermal locomotive and a standard electric locomotive are given
Train length	Maximum allowed length for a train (in meters, locomotive included)
Line category	e.g. D4, D5..., in the sheets for SNCF Réseau and ÖBB this is partly indicated as 22,5t
Number of tracks	Number of tracks on the line section
Gradient	Gradient (in permille) of the line section - most important in Switzerland and Austria
Gauge	e.g. GB, GB1, GC, etc.
Intermodal Freight Code	The information is mostly given with the P/C code in standard format, e.g. P/C 70/400; exemptions: RFI uses the codes P/C45, P/C80 etc, SNCF Réseau uses the codes C45
Signalling	This column is filled out with the version of ETCS (when in use) or the class B system e.g. ATB EG, TBL1+, SCMT etc.
Speed	This is filled out with either the max. speed for a freight train or the maximum speed allowed on the line section (in km/h)
Length of re-routing Option	In km
Weight	The maximum weight (in tons) which can be handled by one locomotive. Often different per direction, e.g. due to gradient, therefore mostly two figures given, for each direction If not otherwise stated the assumed locomotives are: NL: BR 189, BE: Traxx and class 66, DE: DB 185, LU n/a, FR n/a, CH n/a, IT: group A, AU: class 1216.
Miscellaneous	This column is used to give any useful extra information

1.5.2. Explanations regarding the usability indication

In the event of a major incident there can be several possible re-routing options. For the scenarios the usability of these possible routes is indicated in three categories. This can facilitate the process of re-routing.

The categorization is defined in options A, B and C. There is no fixed definition for the degree of usability, but the assessment depends on several aspects regarding capacity, technical and/or organisational restrictions (possibilities and limitations). The classification is based on the expert estimates of experienced train traffic controllers (aimed at re-routing freight trains).

The categories are:

- A: good availability (no major restrictions)
- B: usability is reasonable (with some restrictions)
- C: usability is worst (some major capacity, technical and/or organisational restrictions)

1.5.3. Explanations regarding the capacity indication

Capacity indications which are given in this document are indications of the free capacity on a deviation route in case of an incident. The assessment is related to the traffic volume on RFC Rhine-Alpine and based on the following ranges:

- appr. < 10 trains per day per direction: **extremely limited**
- appr. 10 – 24 trains per day per direction: **limited**
- appr. 25 – 50 trains per day per direction: **good**
- > 50 trains per day per direction: **excellent**

Detailed information regarding the capacity available on a deviation route can only be given in case of an incident. The capacity depends very much on the concrete situation at the time of the incident, for example including the traffic volume at the time of the year/month and the situation regarding temporary capacity restrictions.

1.5.4. Capacity which is taken into account

These re-routing scenarios can only consider free capacity, so remaining after allocation from yearly timetable and ad hoc capacity (estimations on basis of historical information). This has led to situations that some lines are not shown because there is almost no capacity left and that the mentioned capacity in the table is lower than expected.

For heavily used networks discussions are ongoing between legislators and IMs to get the possibility to withdraw or reschedule already allocated capacity. This possibility, which is not part of the existing European legislation, could give IMs the competence to create space to reallocate the capacity in favour of the re-routing of (international) freight trains.

1.6. Traffic volume on RFC Rhine-Alpine

The Rhine-Alpine corridor is connecting the biggest European seaports with the hinterland, crosses large European metropolitan areas and links big industrial centres, as for example northern Italy. The intermodal market share of rail freight transport is comparatively high, also due to the strong political support in Switzerland for the alpine transit traffic.

RFC Rhine-Alpine is regularly monitoring the number of international freight trains that are crossing border points on the corridor. These figures give an indication on the international traffic on the principal routes of the Rhine-Alpine corridor which would have to be re-routed in case of an international disruption. However, the exact train numbers per day and week differ strongly during the year, between weekdays/weekends and night/day, during holiday periods, etc. The highest volume goes via the border crossing at Basel, with an average of 140-150 trains/day (both directions).

The following table shows the number of trains at the border crossings related to RFC Rhine-Alpine.

	2019
Netherlands / Germany	
Emmerich	21.434
Venlo	17.877
Bad Bentheim	6.056
Belgium / Germany	
Montzen	23.268
Germany / Switzerland	
Basel	51.938
Switzerland / Italy	
Domodossola	21.784
Chiasso	15.442
Pino	9.956

1.7. Structure of the document

The re-routing scenarios are presented as follows: Chapter 2 focusses on the re-routing scenarios for the northern part of RFC Rhine-Alpine, chapter 3 covers re-routing scenarios for middle part and chapter 4 describes the re-routing scenarios on the southern part of RFC Rhine-Alpine. Each part is first introduced with an overview map of the relevant sections with limited re-routing possibilities plus short descriptions of the re-routing options. The overview is followed by detailed descriptions of the main re-routing options for each of these sections, including detailed maps and a description of the re-routing options with characteristics and parameters. A full map including all routes presented in this document as well as a table of all re-routing options is shown in Annex 1 and Annex 2, respectively.

The presented re-routing options focus on freight train re-routing.

1.8. Disclaimer / Limitation of Liability

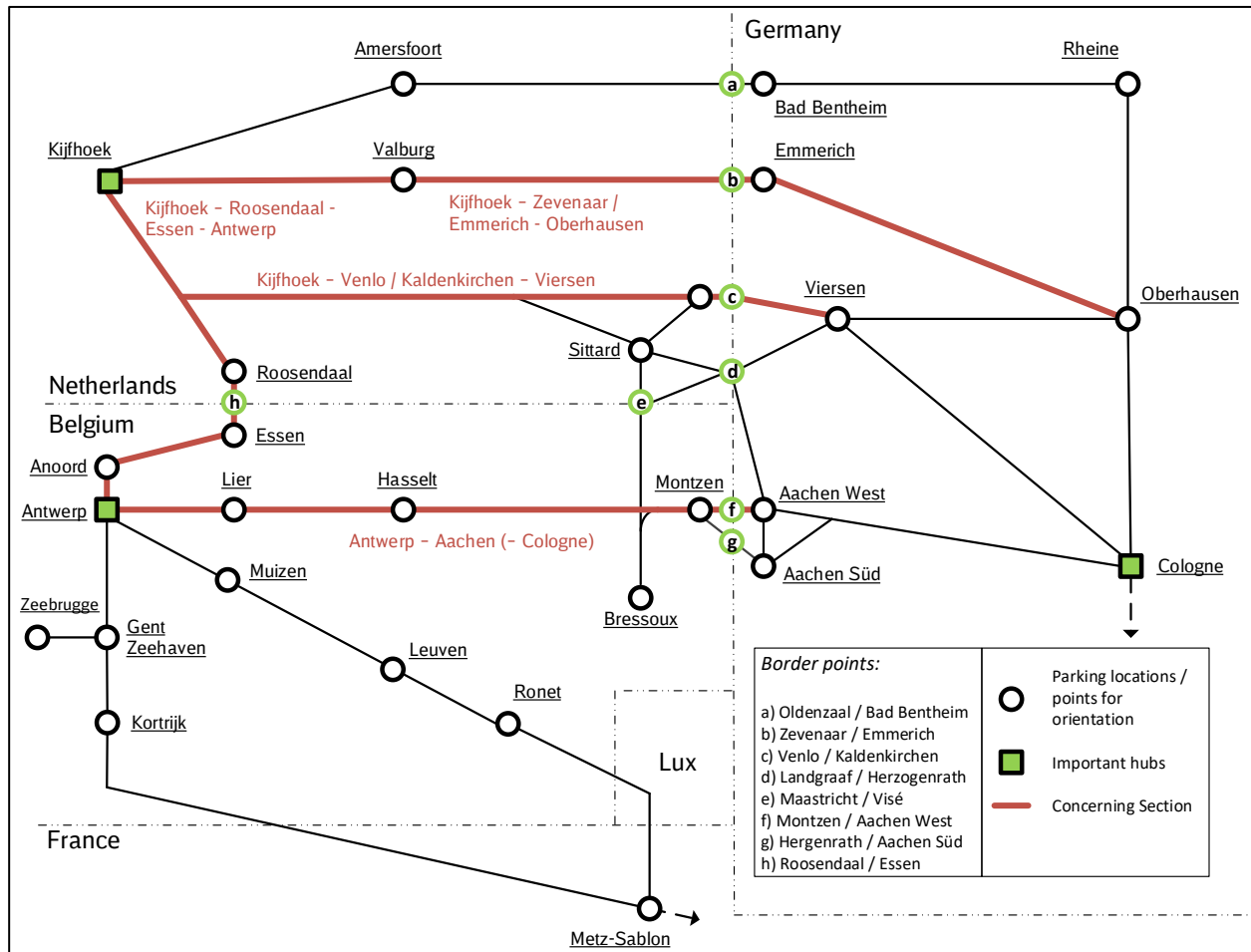
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2 Northern Part

2.1. Overview re-routing scenarios northern part

The following sections with limited re-routing possibilities are defined for the northern part of the RFC Rhine-Alpine.



Some re-routing options can be used for various sections.

On the northern part of RFC Rhine-Alpine the following routes can be used for rail freight operations. All of these routes can be used as re-routing options, depending on the line section where an incident happens.

Section ID	Route
NL-DE-1	Kijfhoek - Zevenaar / Emmerich - Oberhausen
NL-DE-2	Kijfhoek - Venlo / Kaldenkirchen - Viersen
NL-DE-3	Kijfhoek - Oldenzaal / Bad Bentheim - Rheine
NL-BE-DE-1	Kijfhoek - Roosendaal / Essen - Aachen West - Cologne
NL-BE-DE-2	Kijfhoek - Roermond - Maastricht / Visé - Bressoux - Montzen / Aachen West - Cologne
NL-BE-LU-FR-CH-1	Kijfhoek / Antwerp - Roosendaal/Essen - Luxemburg - FR - Basel

NL-BE-DE-3	Cologne - Aachen Rothe Erde - Aachen Süd - Hergenrath - Montzen - Roosendaal - Kijfhoek (if incident between Aachen West and Montzen)
BE-NL-DE-1	Antwerp - Roosendaal / Essen - Kijfhoek - Emmerich - Oberhausen
BE-NL-DE-2	Antwerp - Roosendaal / Essen - Venlo / Kaldenkirchen - Viersen
BE-NL-DE-3	Antwerp - Roosendaal / Essen - Maastrich / Visé - Bressoux - Aachen West
BE-FR-1	Antwerp - Kortrijk - FR
BE-LU-FR-1	Antwerp - Luxemburg - FR

NL-DE-1: Kijfhoek - Zevenaar / Emmerich - Oberhausen

The route Kijfhoek - Zevenaar / Emmerich - Oberhausen (Betuweroute) is between Kijfhoek and the Dutch/German border the main freight rail connection between Rotterdam and Germany. In the Netherlands it is a double track freight line which is equipped with ETCS L2 2.3.0d and 25kV. Between the Dutch /German border and Oberhausen this is a double mixed track (for freight and passenger trains) with PZB signalling and 15 kV.

NL-DE-2: Kijfhoek - Venlo / Kaldenkirchen - Viersen

For the Netherlands, this is the second main freight route to Germany. It is a double mixed track (passenger and freight trains) with ATB signalling and 1,5 kV electricity. Between Kaldenkirchen and Viersen Gbf it is a single track, with PZB and 15 kV. The tracks between Roosendaal and Venlo and Kijfhoek and Venlo are suitable for 740-meter trains. However, the maximum train length is determined by the length of the tracks at the Venlo border station. (±650 meters). In Germany trains can be max. 690 meters long.

NL-DE-3: Kijfhoek - Oldenzaal / Bad Bentheim - Rheine

In the Netherlands, this is mainly a double mixed track (passenger and freight trains) with ATB signalling and 1,5 kV electricity. Trains can run via Weesp - Amersfoort - Oldenzaal - Bad Bentheim or via the Betuweroute (Meteren - Elst) - Deventer (change headway) - Oldenzaal - Bad Bentheim. Between Bad Bentheim and Rheine it is also a double mixed track with PZB and 15 kV.

Train length is normally 590 meters, but longer trains could run with the consent of DB Netz. ProRail takes care for the coordination with DB Netz.

NL-BE-DE-1: Kijfhoek - Roosendaal / Essen - Aachen West - Cologne

This is a double mixed (passenger and freight trains) track. In the Netherlands it has ATB signalling and 1,5 kV electricity. In Belgium (as from Roosendaal) it has TBL1+ signalling and 3 kV electricity. Electric trains can run through the power change installation.

NL-BE-DE-2: Kijfhoek – Roermond – Maastricht / Visé – Bressoux – Montzen / Aachen West – Cologne

For the Netherlands, this route mainly follows the Brabantroute (second main freight line) and from Eindhoven it goes via Sittard to Maastricht. It is a double mixed (passenger and freight trains) track with ATB signalling and 1,5 kV electricity on the Dutch network. From Eijsden into Belgium the route has TBL1+ signalling and 3 kV electricity. Electric powered trains can run through the power change installation.

BE-FR-1: Antwerp – Kortrijk – FR

In Belgium the route goes via Antwerp – Kortrijk to France. In France the route is via Lille – Metz – Strasbourg – Basel. In France the tracks have 25 kV electricity and KVB signalling.

NL-BE-LU-FR-CH-1: Kijfhoek / Antwerp – Roosendaal/Essen – Luxemburg – FR – Basel

This is an RFC North Sea-Mediterranean main route from the Netherlands via Belgium, Luxembourg and France to Switzerland. Between Kijfhoek – Roosendaal it is a double mixed (passenger and freight trains) track with ATB signalling and 1,5 kV electricity. In Belgium the route has TBL1+ signalling and 3 kV electricity. In Belgium the route is via Antwerp – Muizen – Leuven – Namur until the border at Aubange. The route in Luxemburg has ETCS L1 and 25 kV. In France the route goes via Woippy / Metz – Strasbourg – Mulhouse to Basel. In France the tracks have 25 kV electricity and KVB signalling.

Between Saint Louis border and Basel Muttentz, the intermodal freight code is given with EBV 1 / C25/344. However, there is an annual AS-eeee-0945 (Extraordinary shipments), in which this track is recorded. According to this, consignments C45 / 353, B45 / 353, WoodTainer and other shipments are possible.

In the French network several possibilities to cross to the German network exist, please see restrictions in the following chapters.

NL-BE-DE-3: Cologne – Aachen Rothe Erde – Aachen Süd – Hergenrath – Montzen – Roosendaal – Kijfhoek (if incident between Aachen West and Montzen)

This re-routing option is only usable for the direction Germany to Belgium / Netherlands because the infrastructure cannot facilitate the other direction. Train lengths are limited to 400 meters with e-loco and 650 with diesel loco.

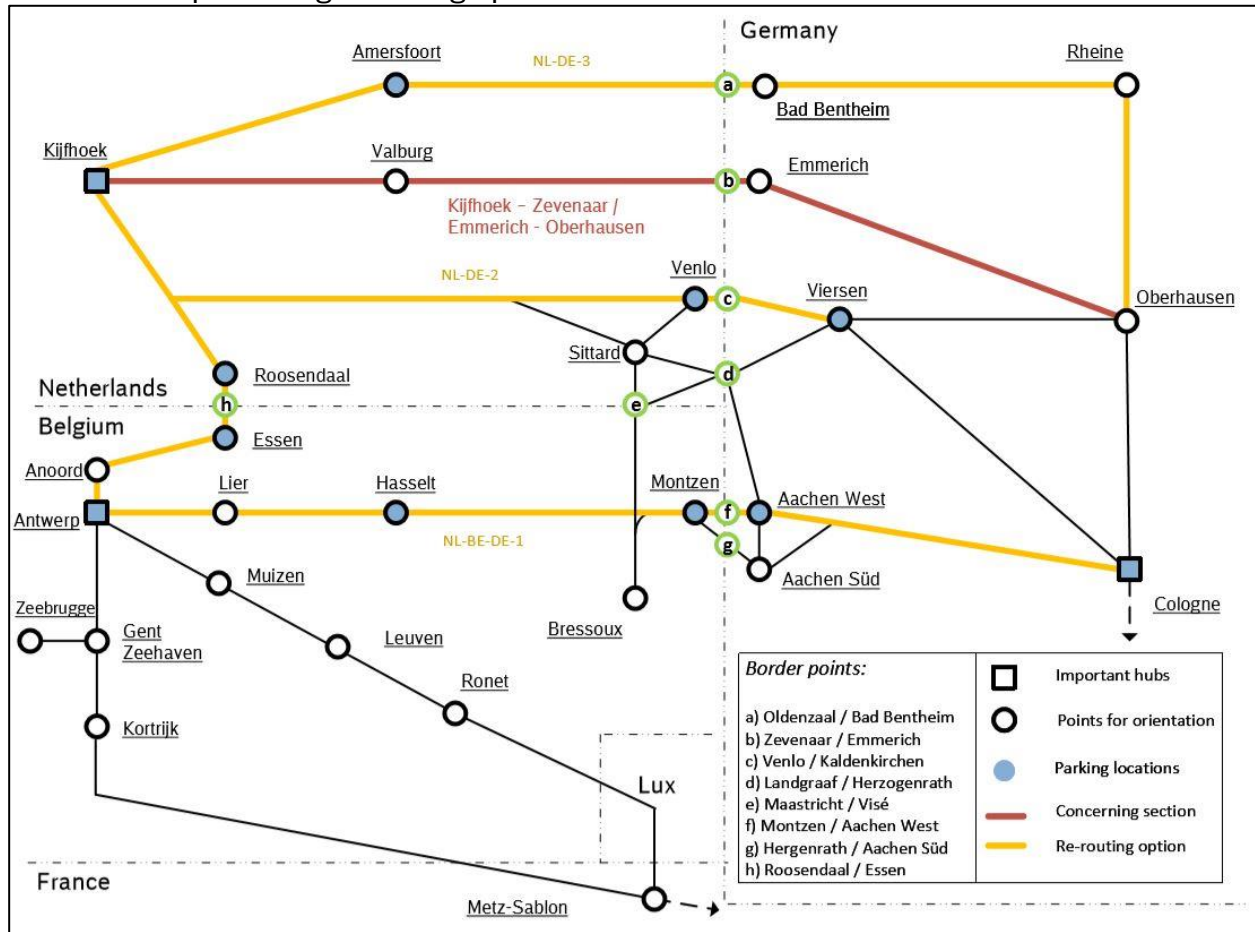
NL-BE-DE-1: Antwerp – Aachen West – Cologne

This is the so called *Montzenroute*. It is a very important route for hinterland traffic of the big ports in Belgium. The route starts in Antwerp and follows Lier, Hasselt and goes via Montzen to Aachen West. The whole route is electrified with 15 kV 16,7 Hz in Germany and 3 kV in Belgium. The whole route is double track. Between Glons and Aachen the route is freight traffic only. Depending on the type of locomotive, for this stretch (but only direction Germany – Belgium) very heavy trains may need an additional pushing locomotive due to gradient conditions.

2.2. Re-routing scenario for section Kijfhoek – Zevenaar / Emmerich – Oberhausen

2.2.1. General description

Schematic map including re-routing options



When the route Kijfhoek – Zevenaar / Emmerich – Oberhausen is blocked re-routing options are:

Section ID	Usability	Route
NL-DE-2	A	Kijfhoek – Venlo / Kaldenkirchen – Viersen
NL-DE-3	B	Kijfhoek – Oldenzaal / Bad Bentheim – Rheine
NL-BE-DE-1	B	Kijfhoek – Roosendaal / Essen – Aachen West – Cologne

These routes should normally cover the number of trains that go via the disturbed route Kijfhoek – Zevenaar / Emmerich – Oberhausen. Other routes presented in chapter 2 could also be used but have a “C” rating under usability. They are therefore not included in this scenario description.

2.2.2. Parameters of re-routing options including capacity indication

IM	Line section	Usage		Traction power	Train length	Line category	Number of tracks	Gradient	Gauge	Intermodal freight code	Signalling	Speed	Length of re-routing option	Weight	Miscellaneous	Capacity Indication
		Pass	Frei													
Section: Kijfhoek – Zevenaar / Emmerich – Oberhausen																
ProRail	Kijfhoek - Zevenaar border	x	x	25 kV AC	690	D4	2	N/A	GC	P/C 80/410	L2 - 2.3.0d	120	112,7	5400 (double traction)		Excellent
DB Netz	Emmerich border - Oberhausen	x	x	AC 15 kV 16,7Hz	690	D4	2	N/A	Upon request	P/C 80/410	PZB	160	71	with Loco DB 185: Em-Ob: 2.840 Ob-Em: 3.260	Upgrade to 3 tracks	Good
NL-DE-3: Kijfhoek – Oldenzaal / Bad Bentheim - Rheine																
ProRail	Kijfhoek - Oldenzaal border	x	x	1.5 kV DC	590/600	D4	2	N/A	P/C 80/410	P/C 80/410	ATB EG	100	252,2	2100-2400	Kijfhoek - Oldenzaal: trains via Elst have to change direction in Deventer expect waiting times for system change at NL-GER border	Good
DB Netz	Bad Bentheim border - Rheine	x	x	AC 15 kV 16,7Hz	600	D4	2	N/A	Upon request	P/C 80/410	PZB	Up to 160	30	with Loco DB 185: BB-Rh: 2.750 Rh-BB: 3.560		Limited
NL-DE-2: Kijfhoek - Venlo / Kaldenkirchen - Viersen																
ProRail	Kijfhoek - Venlo border	x	x	1.5 kV DC	±650/740	D4	2	N/A	G2	P/C 80/410	ATB EG	100	147,8	2100-2400	650m when crossing Venlo border or special permit required	Good
DB Netz	Kaldenkirchen border - Viersen	x	x	AC 15 kV 16,7Hz	690	D4	1	N/A	Upon request	P/C 80/410	PZB	Up to 100	20	2340-2855	one-Track between Kaldenkirchen-Viersen, capacity restrictions can occur Northern destinations: direction change in Viersen	Good
NL-BE-DE-1: Kijfhoek - Roosendaal / Essen - Aachen West – Cologne																
ProRail	Kijfhoek - Roosendaal border	x	x	1.5 kV DC	740	D4	2	N/A	G2	P/C 80/410	ATB EG	100	42,7	2100-2400		Good, 740 m limited
Infrabel	Essen border - Montzen border	x	x	3kv	740	D4	2	N/A	GB	P/C 70/400	TBL1+	90/100	177,3	1800-2470	Between Antwerpen Luchtbal and Lier = comprehensive network Aachen - Glons: maybe additional pushing locomotive for very heavy trains Electric powered trains can run through the power change installation.	Limited
DB Netz	Aachen border - Cologne	x	x	AC 15 kV 16,7Hz	740	D4	2	< 40‰	Upon request	P/C 80/410	PZB	100	78	1210-2905		Limited

2.2.3. Parking locations / side tracks & capacity

NL-DE-2: Kijfhoek – Venlo / Kaldenkirchen – Viersen

Country	Location	Number of tracks	Maximum train length	Restrictions
Netherlands	Kijfhoek	>10	max. train length 740 meters	
Netherlands	Venlo	10	1 track max. train length 690 meters others < 690 meters	parking limitations for dangerous goods
Germany	Viersen	2	1x612m, 1x700m	sometimes head making for directions Oberhausen
Germany	Cologne	many tracks		various locations, depending on directions (Köln Gremberg, Köln Eifeltor, Köln Ehrenfeld, Köln Kalk, etc.)

NL-DE-3: Kijfhoek – Oldenzaal / Bad Bentheim – Rheine

Country	Location	Number of tracks	Maximum train length	Restrictions
Netherlands	Amersfoort	3	Appr. 700 meters	
Netherlands	Rotterdam Noord Goederen	1	664 meters	Kijfhoek – Bad Bentheim. Sidetrack for overtaking by passenger trains
Germany	Bad Bentheim	no parking places	track for short stop (max. 20 minutes)	length limitations of 690 meters, because of stop at border

NL-BE-DE-1: Kijfhoek – Roosendaal / Essen – Aachen West – Cologne

Country	Location	Number of tracks	Maximum train length	Restrictions
Netherlands	Kijfhoek	>10	max. train length 740 meters	
Netherlands	Roosendaal	4	1 track of 740 meters 3 tracks of <600 meters others < 690 meters	
Belgium	Essen	1	max. 605 meters	crowded
Belgium	Antwerp North	appr. 10	max. 700 meters	
Belgium	Antwerp Schijnpoort	3	max. 776 meters	
Belgium	Hasselt	3	max. 730 meters	
Belgium	Montzen	7	max. 769 meters	
Germany	Aachen West	5	~700 meters	
Germany	Cologne	many tracks		various locations, depending on directions (Köln Gremberg, Köln Eifeltor, Köln Ehrenfeld, Köln Kalk, etc.)

2.2.4. Restrictions

Each re-routing option can have specific restrictions which are commented here.

NL-DE-2: Kijfhoek – Venlo / Kaldenkirchen – Viersen

- The route between Kaldenkirchen and Viersen is a single track, capacity restrictions can occur.
- For destinations to the North, trains must change direction in Viersen.
- Trains crossing the border at Venlo may not be longer than 650 meters due to restricted loop sidings in Breyell. In the case of longer trains, a special permit needs to be requested at DB Netz (BZ Duisburg) and at ProRail (LVL-DVL-GD). Special trains for the section Kaldenkirchen – Venlo need to apply at „Servicecenter Sonderfahrplan“ of DB Netz AG in Duisburg. This takes place in coordination with Decentrale Verkeersleiding in Eindhoven.

NL-DE-3: Kijfhoek – Oldenzaal / Bad Bentheim – Rheine

- Trains which run via Kijfhoek – Elst – Deventer – Oldenzaal must change direction in Deventer.
- Trains which run via Kijfhoek – Weesp – Amersfoort – Deventer – Oldenzaal do not have to change direction. Locos must be equipped with 1.5 kV + 25 kV and ATB + ERTMS if they enter Port of Rotterdam.
- Trains must often stop at the Dutch / German border, due to system change. Train length is normally 590 meters, but longer trains could run with the consent of DB Netz. ProRail takes care for the coordination with DB Netz.
- Capacity is limited between Bad Bentheim and Rheine.

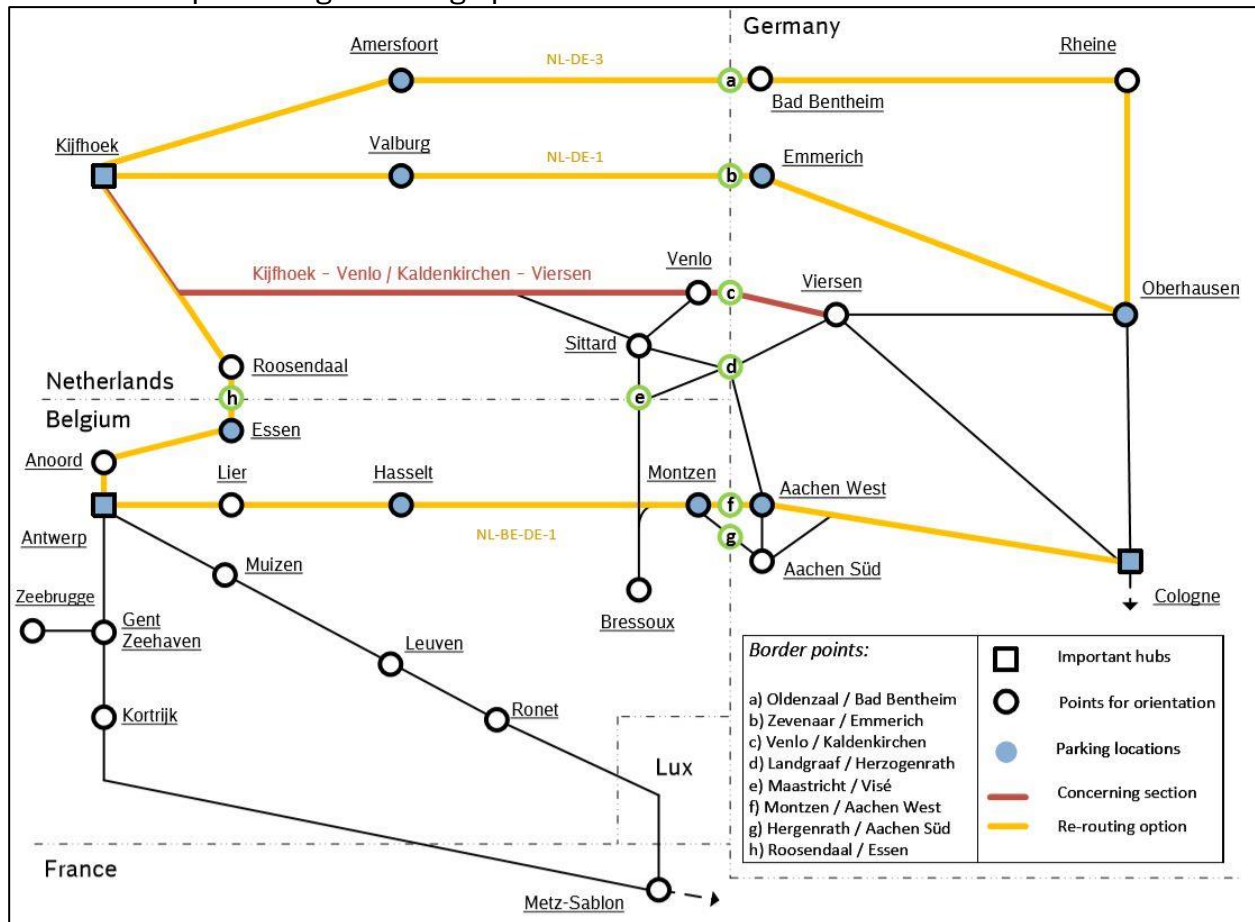
NL-BE-DE-1: Kijfhoek – Roosendaal / Essen – Aachen West – Cologne

- On the Belgian section the maximal intermodal freight gauge is P/C 70/400 and the capacity is limited.
- In Germany the capacity is limited.

2.3. Re-routing scenario for section Kijfhoek – Venlo / Kaldenkirchen – Viersen

2.3.1. General description

Schematic map including re-routing options



For the Netherlands, the route via Venlo / Kaldenkirchen is the second main freight route to Germany. It is a double mixed track (passenger and freight trains) with ATB signalling and 1,5 kV electricity. Between Kaldenkirchen and Viersen Gbf it is a single track, with PZB and 15 kV.

When this route is blocked the re-routing options are:

Section ID	Usability	Route
NL-DE-1	A	Kijfhoek – Zevenaar / Emmerich – Oberhausen
NL-DE-3	B	Kijfhoek – Oldenzaal / Bad Bentheim – Rheine
NL-BE-DE-1	B	Kijfhoek – Roosendaal / Essen – Aachen West – Cologne

Other routes presented in chapter 2.1. could also be used but have a “C” rating under usability. They are therefore not included in this scenario description.

2.3.2. Parameters of re-routing options including capacity indication

IM	Line section	Usage		Traction power	Train length	Line category	Number of tracks	Gradient	Gauge	Intermodal freight code	Signalling	Speed	Length of re-routing option	Weight	Miscellaneous	Capacity Indication
		Pass	Frei													
Section: Kijfhoek – Venlo / Kaldenkirchen – Viersen																
ProRail	Kijfhoek - Venlo border	x	x	1.5 kV DC	±650/740	D4	2	N/A	G2	P/C 80/410	ATB EG	100	147,8	2100-2400	650m when crossing Venlo border or special permit required	Good
DB Netz	Kaldenkirchen border - Viersen	x	x	AC 15 kV 16,7Hz	690	D4	1	N/A	Upon request	P/C 80/410	PZB	Up to 100	20	2340-2855	one-Track between Kaldenkirchen-Viersen, capacity restrictions can occur Northern destinations: direction change in Viersen	Good
ProRail	Kijfhoek - Zevenaar border	x	x	25 kV AC	690	D4	2	N/A	GC	P/C 80/410	L2 - 2.3.0d	120	112,7	5400 (double traction)		Excellent
DB Netz	Emmerich border - Oberhausen	x	x	AC 15 kV 16,7Hz	690	D4	2	N/A	Upon request	P/C 80/410	PZB	160	71	with Loco DB 185: Em-Ob: 2.840 Ob-Em: 3.260	Upgrade to 3 tracks	Good
NL-DE-1: Kijfhoek – Zevenaar / Emmerich - Oberhausen																
ProRail	Kijfhoek - Zevenaar border	x	x	25 kV AC	690	D4	2	N/A	GC	P/C 80/410	L2 - 2.3.0d	120	112,7	5400 (double traction)		Excellent
DB Netz	Emmerich border - Oberhausen	x	x	AC 15 kV 16,7Hz	690	D4	2	N/A	Upon request	P/C 80/410	PZB	160	71	with Loco DB 185: Em-Ob: 2.840 Ob-Em: 3.260	Upgrade to 3 tracks	Good
NL-DE-3: Kijfhoek – Oldenzaal / Bad Bentheim - Rheine																
ProRail	Kijfhoek - Oldenzaal border	x	x	1.5 kV DC	590/600	D4	2	N/A	G2	P/C 80/410	ATB EG	100	252,2	2100-2400	Kijfhoek - Oldenzaal: trains via Elst have to change direction in Deventer expect waiting times for system change at NL-GER border	Good
DB Netz	Bad Bentheim border - Rheine	x	x	AC 15 kV 16,7Hz	600	D4	2	N/A	Upon request	P/C 80/410	PZB	Up to 160	30	with Loco DB 185: BB-Rh: 2.750 Rh-BB: 3.560		Limited
NL-BE-DE-1: Kijfhoek - Roosendaal / Essen - Aachen West - Cologne																
ProRail	Kijfhoek - Roosendaal border	x	x	1.5 kV DC	740	D4	2	N/A	G2	P/C 80/410	ATB EG	100	42,7	2100-2400		Good, 740 n limited
Infrabel	Essen border - Montzen border	x	x	3kv	740	D4	2	N/A	GB	P/C 70/400	TBL1+	90/100	177,3	1800-2470	Between Antwerpen Luchtbal and Lier = comprehensive network Aachen - Glons: maybe additional pushing locomotive for very heavy trains Electric powered trains can run through the power change installation.	Limited
DB Netz	Aachen border - Cologne	x	x	AC 15 kV 16,7Hz	740	D4	2	< 40‰	Upon request	P/C 80/410	PZB	100	78	1210-2905		Limited

2.3.3. Parking locations & capacity

NL-DE-1: Kijfhoek - Zevenaar / Emmerich - Oberhausen

Country	Location	Number of tracks	Maximum train length	Restrictions
Netherlands	Kijfhoek	>10	max. train length 740 meters	
Netherlands	Valburg	9	5 tracks max. train length 740 meters	
			4 tracks < 740 m train length	
Germany	Oberhausen	10	~700 meters	
Germany	Emmerich	5	< 750 meters	only in direction of Netherlands, otherwise capacity limitations
Germany	Wesel	4	2x410m, 1x507m, 1x630m	
Germany	Cologne	many tracks		various locations, depending on directions (Köln Gremberg, Köln Eifelt, Köln Ehrenfeld, Köln Kalk, etc.)

NL-DE-3: Kijfhoek - Oldenzaal / Bad Bentheim - Rheine

Country	Location	Number of tracks	Maximum train length	Restrictions
Netherlands	Amersfoort	3	appr. 700 meters	
Netherlands	Rotterdam Noord Goederen	1	664 meters	Kijfhoek - Bad Bentheim. Sidetrack for overtaking by passenger trains
Germany	Bad Bentheim	no parking places	track for short stop (max. 20 minutes)	length limitations of 690 meter, because of stop at border

NL-BE-DE-1: Kijfhoek - Roosendaal / Essen - Aachen West - Cologne

Country	Location	Number of tracks	Maximum train length	Restrictions
Netherlands	Kijfhoek	>10	max. train length 740 meters	
Netherlands	Roosendaal	4	1 track of 740 meters 3 tracks of <600 meters	
			others < 690 meters	
Belgium	Essen	1	max. 605 meters	crowded
Belgium	Antwerp North	appr. 10	max. 700 meters	
Belgium	Antwerp Schijnpoort	3	max. 776 meters	
Belgium	Hasselt	3	max. 730 meters	
Belgium	Montzen	7	max. 769 meters	
Germany	Aachen West	5	~700 meters	

Country	Location	Number of tracks	Maximum train length	Restrictions
Germany	Cologne	many tracks		various locations, depending on directions (Köln Gremberg, Köln Eifelt, Köln Ehrenfeld, Köln Kalk, etc.)

2.3.4. Restrictions

Each re-routing option can have specific restrictions which are commented here.

NL-DE-1: Kijfhoek – Zevenaar / Emmerich – Oberhausen

- Signalling: on the route Kijfhoek – Emmerich locomotives need to have ETCS (version L2 - 2.3.0d).

NL-DE-3: Kijfhoek – Oldenzaal / Bad Bentheim – Rheine

- Trains which run via Kijfhoek – Elst – Deventer – Oldenzaal must change direction in Deventer. Locos must be equipped with 1.5 kV + 25 kV and ATB + ERTMS if they enter Port of Rotterdam.
- Trains must often stop at the Dutch / German border, due to system change. Train length is normally 590 meters, but longer trains could run with the consent of DB Netz. ProRail takes care of the coordination with DB Netz.
- Capacity is limited between Bad Bentheim and Rheine.

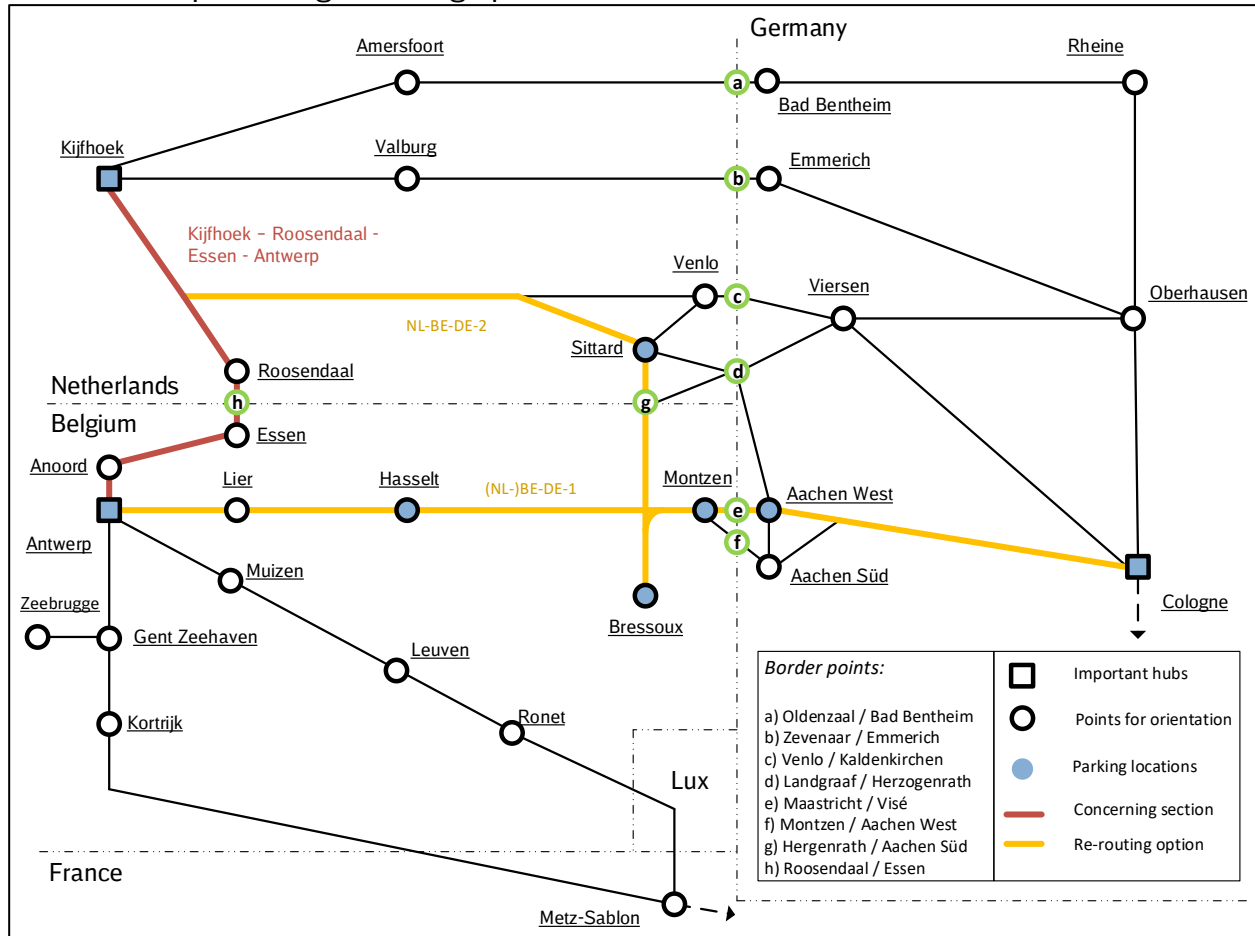
NL-BE-DE-1: Kijfhoek - Roosendaal / Essen - Aachen West - Cologne

- On the Belgian section the maximal intermodal freight gauge is P/C 70/400 and the capacity is limited.
- In Germany the capacity is limited.

2.4. Re-routing scenario for section Kijfhoek – Roosendaal – Essen – Antwerp

2.4.1. General description

Schematic map including re-routing options.



This is a double mixed (passenger and freight trains) track. In the Netherlands it has ATB signalling and 1,5 kV electricity. In Belgium (as from Roosendaal) it has TBL1+ signalling and 3 kV electricity.

When this route is blocked the re-routing options are:

Section ID	Usability	Route
NL-BE-DE-2	C	Kijfhoek – Roermond – Maastricht / Visé – Bressoux – Montzen / Aachen West – Cologne
(NL-)BE-DE-1	B	(Kijfhoek – Roosendaal –) Antwerp – Aachen West – Cologne

2.4.2. Parameters of re-routing options including capacity indication

IM	Line section	Usage		Traction power	Train length	Line category	Number of tracks	Gradient	Gauge	Intermodal freight code	Signalling	Speed	Length of re-routing option	Weight	Miscellaneous	Capacity Indication
		Pass	Frei													
Section: Kijfhoek - Roosendaal - Essen - Antwerp																
ProRail	Kijfhoek - Roosendaal border	x	x	1.5 kV DC	740	D4	2	N/A	G2	P/C 80/410	ATB EG	100	42,7	2100-2400		Good, 740 m limited
Infrabel	Antwerp - Essen border	x	x	3kv	740	D4	2	N/A	GB	P/C 70/400	TBL1+	100	23	2200-2470	no dangerous goods allowed in the Kennedy tunnel in Antwerp Re-routing via Antwerp North and Antigoon Tunnel possible	Limited
(NL)-BE-DE-1: (Kijfhoek - Roosendaal -) Antwerp - Aachen West – Cologne																
ProRail	Kijfhoek - Roosendaal border	x	x	1.5 kV DC	740	D4	2	N/A	G2	P/C 80/410	ATB EG	100	42,7	2100-2400		Good, 740 m limited
Infrabel	Essen border - Montzen border	x	x	3kv	740	D4	2	N/A	GB	P/C 70/400	TBL1+	90/100	177,3	1800-2470	Between Antwerpen Luchtbal and Lier = comprehensive network Aachen - Glons: maybe additional pushing locomotive for very heavy trains Electric powered trains can run through the power change installation.	Limited
Infrabel	Antwerp - Montzen border	x	x	3kv	740	D4	2	N/A	GB	P/C 70/400	TBL1+ / TBL1+ + ETCS L1 between Antwerp North – Lier	90	145,5	2000	Between Antwerpen Luchtbal and Lier = comprehensive network Aachen - Glons: maybe additional pushing locomotive for very heavy trains	Limited
DB Netz	Aachen border - Cologne	x	x	AC 15 kV 16,7Hz	740	D4	2	< 40‰	Upon request	P/C 80/410	PZB	100	78	1210-2905		Limited
NL-BE-DE-2: Kijfhoek – Roermond – Maastricht / Visé – Bressoux – Montzen / Aachen West - Cologne																
ProRail	Kijfhoek - Eindhoven	x	x	1.5 kV DC	±650 / [740 pilot]	D4	2	N/A	G2	P/C 80/410	ATB EG	100	93	2100-2400		Excellent, 740 limited
ProRail	Eindhoven - Sittard - Eijsden border	x	x	1.5 kV DC	±630	D4	2	N/A	G2	P/C 80/410	ATB EG	100	110	2100-2400		Limited
Infrabel	Visé border - Bressoux - Montzen border	x	x	3kv	740	D4	2	N/A	GB	P/C 70/400	TBL1+	90	56	1800-2300	From Visé border - Bressoux - Y.Berneau: P/C 60- 380/90 / Visé Border to Visé = Off Ten-T Direction change in Bressoux Driver must be able to speak French on parts of the route Aachen - Glons: maybe additional pushing locomotive for very heavy trains Electric powered trains can run through the power change installation.	Limited
DB Netz	Aachen border - Cologne	x	x	AC 15 kV 16,7Hz	740	D4	2	< 40‰	Upon request	P/C 80/410	PZB	100	78	1210-2905		Limited

2.4.3. Parking locations & capacity

NL-BE-DE-2: Kijfhoek - Roermond - Maastricht / Visé - Bressoux - Montzen / Aachen West - Cologne

Country	Location	Number of tracks	Maximum train length	Restrictions
Netherlands	Kijfhoek	>10	max. train length 740 meters	
Netherlands	Sittard	4	max. train length 590 - 690 meters	
Belgium	Bressoux	7	min. 650 - max. 850 meters	2 tracks necessary for head making
Belgium	Montzen	7	max. 769 meters	
Germany	Aachen West	5	>700 meters	
Germany	Cologne	many tracks		various locations, depending on directions (Köln Gremberg, Köln Eifeltor, Köln Ehrenfeld, Köln Kalk, etc.)

NL-BE-DE-1: (Kijfhoek - Roosendaal -) Antwerp - Aachen West - Cologne

Country	Location	Number of tracks	Maximum train length	Restrictions
Belgium	Antwerp North	appr. 10	max. 700 meters	
Belgium	Antwerp Schijnpoort	3	max. 776 meters	
Belgium	Hasselt	3	max. 730 meters	
Belgium	Montzen	7	max. 769 meters	
Germany	Aachen West	5	>700 meters	
Germany	Cologne	many tracks		various locations, depending on directions (Köln Gremberg, Köln Eifeltor, Köln Ehrenfeld, Köln Kalk, etc.)

2.4.4. Restrictions

Each re-routing option can have specific restrictions which are commented here.

NL-BE-DE-2: Kijfhoek - Roermond - Maastricht / Visé - Bressoux - Montzen / Aachen West - Cologne

- Profile limitations: P/C 70/400 between Bressoux and Visé.
- The trains must change directions in Bressoux.
- Language: on parts of the route (to Montzen) the train driver must be able to speak French.

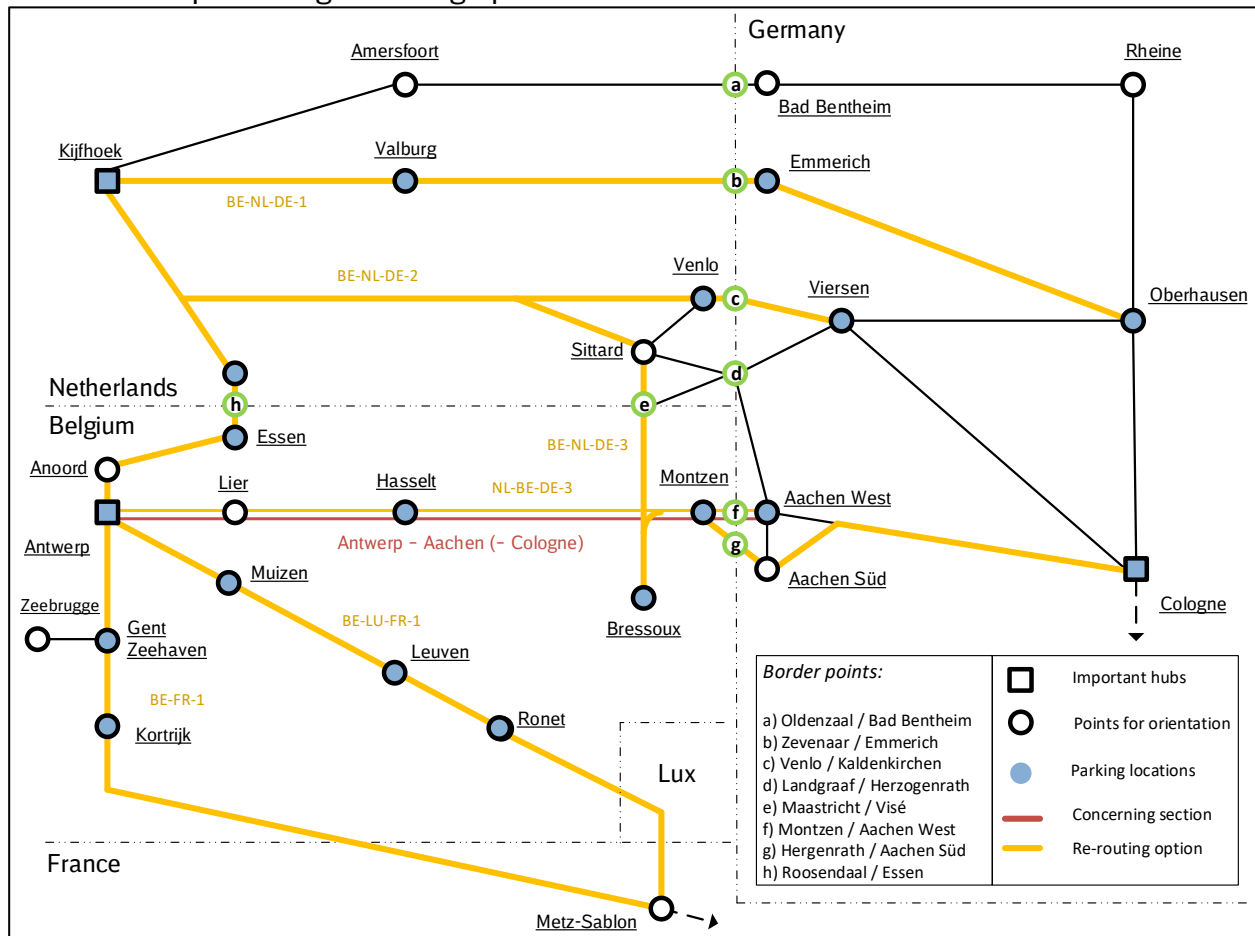
NL-BE-DE-1: (Kijfhoek - Roosendaal -) Antwerp - Aachen West - Cologne

- In Germany the capacity is limited.

2.5. Re-routing scenario for section Antwerp – Aachen (– Cologne)

2.5.1. General description

Schematic map including re-routing options.



This is a double mixed (passenger and freight trains) with TBL1+ signalling and TBL1+ combined with ETCS L1 between Antwerp North and Lier and 3 kV electricity.

When this route is blocked the re-routing options are:

Section ID	Usability	Route
BE-NL-DE-1		Antwerp – Roosendaal / Essen – Kijfhoek – Emmerich – Oberhausen
BE-NL-DE-2	B	Antwerp – Roosendaal / Essen – Venlo / Kaldenkirchen – Viersen
BE-NL-DE-3	C	Antwerp – Roosendaal / Essen – Maastricht / Visé – Bressoux – Aachen West
NL-BE-DE-3	C	Cologne – Aachen Rothe Erde – Aachen Süd – Hergenrath – Montzen – Antwerp (– Roosendaal – Kijfhoek) (if incident between Aachen West and Montzen)
BE-FR-1	C	Antwerp – Kortrijk – FR
BE-LU-FR-1	C	Antwerp – Luxembourg – FR

2.5.2. Parameters of re-routing options including capacity indication

IM	Line section	Usage		Traction power	Train length	Line category	Number of tracks	Gradient	Gauge	Intermodal freight code	Signalling	Speed	Length of re-routing option	Weight	Miscellaneous	Capacity Indication
		Pass	Frei													
Section: Antwerp – Aachen (– Cologne)																
Infrabel	Antwerp - Montzen border	x	x	3kv	740	D4	2	N/A	GB	P/C 70/400	TBL1+ / TBL1++ ETCS L1 between Antwerp North – Lier	90	145,5	2000	Between Antwerpen Luchtbal and Lier = comprehensive network Aachen - Glons: maybe additional pushing locomotive for very heavy trains	Limited
BE-NL-DE-2: Antwerp – Roosendaal /Essen – Venlo / Kaldenkirchen – Viersen																
Infrabel	Antwerp - Essen border	x	x	3kv	740	D4	2	N/A	GB	P/C 70/400	TBL1+	100	23	2200-2470	no dangerous goods allowed in the Kennedy tunnel in Antwerp Re-routing via Antwerp North and Antigoon Tunnel possible	Limited
ProRail	Roosendaal border - Venlo border	x	x	1.5 kV DC	±650	D4	2	N/A	G2	P/C 80/410	ATB EG	100	151	2100-2400		Good/Excellent
DB Netz	Kaldenkirchen border - Viersen	x	x	AC 15 kv 16,7Hz	690	D4	1	N/A	Upon request	P/C 80/410	PZB	Up to 100	20	2340-2855	one-Track between Kaldenkirchen-Viersen, capacity restrictions can occur Northern destinations: direction change in Viersen	Good
BE-NL-DE-3: Antwerp – Roosendaal / Essen – Maastricht / Visé – Bressoux – Aachen West																
Infrabel	Antwerp - Essen border	x	x	3kv	740	D4	2	N/A	GB	P/C 70/400	TBL1+	100	23	2200-2470	no dangerous goods allowed in the Kennedy tunnel in Antwerp Re-routing via Antwerp North and Antigoon Tunnel possible	Limited
ProRail	Roosendaal border - Eindhoven	x	x	1.5 kV DC	±650/740	D4	2	N/A	G2	P/C 80/410	ATB EG	100	89,7	2100-2400		Good/Excellent
ProRail	Eindhoven - Sittard - Eijsden border	x	x	1.5 kV DC	±630	D4	2	N/A	G2	P/C 80/410	ATB EG	100	110	2100-2400		Limited
Infrabel	Visé border - Bressoux - Montzen border	x	x	3kv	740	D4	2	N/A	GB	P/C 70/400	TBL1+	90	56	1800-2300	From Visé border - Bressoux - Y.Berneau: P/C 60- 380/90 / Visé Border to Visé = Off Ten-T Direction change in Bressoux	Limited
BE-LU-FR-1: Antwerp– Luxembourg – FR																
Infrabel	Antwerp - Ronet - Aubange (border LUX)	x	x	3kv	740	D4	2	N/A	GB	PC 70/400	ETCS L1 FS TBL1+	100	283	N-S: 1200 (Diesel), 1600 (Electric) S-N: 900 (Diesel), 1400 (Electric)	Between Antwerpen Luchtbal and Lier = comprehensive network no dangerous goods allowed in the Kennedy tunnel in Antwerp Re-routing via Antwerp North and Antigoon Tunnel possible	Limited
CFL	Rodange - Esch-sur-Alzette - Bettembourg		x	25 kV	750	D4	2	≤ 19‰	GB - C50	Upon request	ETCS Level 1	90		D4		Limited
SNCF Réseau	LUX border - Metz-Sablon - Strasbourg - Mulhouse - Saint Louis border	x	x	25kv AC	750	D4	2	< 12,5‰	GB1	C45	KVB	121-160 km/h		D4		limited - extremely limited
SBB	Saint Louis border – Basel RB Muttentz	x	x	25kV / 15 kV AC	750	D4	2	7‰	EBV 1	C45	KVB L1LS - 3.4.0	100	9	2000	several intermodal freight codes possible due to the annual AS-eeee-0945	Limited

IM	Line section	Usage		Traction power	Train length	Line category	Number of tracks	Gradient	Gauge	Intermodal freight code	Signalling	Speed	Length of re-routing option	Weight	Miscellaneous	Capacity Indication
		Pass	Frei													
BE-FR-1: Antwerp – Kortrijk – FR																
Infrabel	Antwerp – Kortrijk - Mouscron border (France)	x	x	3kv	740	D4	2	N/A	GB	P/C 70/400	TBL1+	100	186,15	1800-2000	no dangerous goods allowed in the Kennedy tunnel in Antwerp Re-routing via Antwerp North and Antigoon Tunnel possible	Limited
SNCF Réseau	Border Belgium – Lille – Longuyon – Thionville - Metz	x	x	25kv AC	750	D4	2 or more	N/A	CB1 (Longuyon – Thionville: 3.3 - C22)	C45 (Longuyon – Thionville: 3.3 - C22)	KVB	120-139		D4		
SNCF Réseau	Metz-Sablon - Strasbourg - Mulhouse - Saint Louis border	x	x	25kv AC	750	D4	2	< 12,5‰	GB1	C45	KVB	121-160 km/h		D4	change of direction in Metz to Woippy	limited - extremely limited
NL-BE-DE-3: Cologne - Aachen Rothe Erde - Aachen Süd – Hergenrath - Montzen – Antwerp (- Roosendaal - Kijfhoek)																
DB Netz	Cologne – Aachen Hbf – Aachen Süd (- Hergenrath)	x	x	AC 15 kV 16,7 Hz	400m with E-Traktion, 650m with V-Traktion (or "Tocal border agreement")	D4	2	N/A	Upon request	P/C 80 / 410	PZB	160	77	1: 2905; 2: 835	as part of re-routing line NL-BE-DE-3: can only be used in direction Cologne - Roosendaal - Kijfhoek Aachen Süd: just one train per hour between 22:00-05:00 hours	Extremely limited
Infrabel	Hergenrath border - Antwerp - Essen border	x	x	3kv	740	D4	2	N/A	GB	P/C 70/400	TBL1+	90	188	1200-1800	Between Hergenrath border and Montzen = Off TEN-T no dangerous goods allowed	Limited
ProRail	Kijfhoek - Roosendaal border	x	x	1.5 kV DC	740	D4	2	N/A	G2	P/C 80/410	ATB EG	100	42,7	2100-2400		Good, 740 m limited
BE-NL-DE-1: Antwerp –Roosendaal / Essen – Kijfhoek – Emmerich – Oberhausen																
Infrabel	Antwerp - Essen border	x	x	3kv	740	D4	2	N/A	GB	P/C 70/400	TBL1+	100	23	2200-2470	no dangerous goods allowed in the Kennedy tunnel in Antwerp Re-routing via Antwerp North and Antigoon Tunnel possible	Limited
ProRail	Kijfhoek - Roosendaal border	x	x	1.5 kV DC	740	D4	2	N/A	G2	P/C 80/410	ATB EG	100	42,7	2100-2400		Good, 740 m limited
ProRail	Kijfhoek - Zevenaar border	x	x	25 kV AC	690	D4	2	N/A	GC	P/C 80/410	L2 - 2.3.0d	120	112,7	5400 (double traction)		Excellent
DB Netz	Emmerich border - Oberhausen	x	x	AC 15 kV 16,7Hz	690	D4	2	N/A	Upon request	P/C 80/410	PZB	160	71	with Loco DB 185: Em-Ob: 2.840 Ob-Em: 3.260	Upgrade to 3 tracks	Good

2.5.3. Parking locations & capacity

BE-NL-DE-1: Antwerp – Kijfhoek – Zevenaar / Emmerich – Oberhausen

Country	Location	Number of tracks	Maximum train length	Restrictions
Belgium	Antwerp North	appr. 10	max. 700 meters	
Belgium	Antwerp Schijnpoort	3	max. 776 meters	
Belgium	Essen	1	max. 605 meters	crowded
Netherlands	Roosendaal	1	max. train length 740 meters	
Netherlands	Roosendaal	3	max. train length < 600 meters	
Netherlands	Kijfhoek	>10	max. train length 740 meters	
Netherlands	Valburg	9	5 tracks max. train length 740 meters	
			4 tracks < 740 meters train length	
Netherlands			others < 690 meters	
Germany	Oberhausen	10	~700 meters	
Germany	Emmerich	5	< 750 meters	only in direction of Netherlands, otherwise capacity limitations
Germany	Wesel	4	2x410m, 1x507m, 1x630m	
Germany	Cologne	many tracks		various locations, depending on directions (Köln Gremberg, Köln Eifelt, Köln Ehrenfeld, Köln Kalk, etc.)

BE-NL-DE-2: Antwerp – Venlo / Kaldenkirchen – Viersen

Country	Location	Number of tracks	Maximum train length	Restrictions
Belgium	Antwerp North	appr. 10	max. 700 meters	
Belgium	Antwerp Schijnpoort	3	max. 776 meters	
Belgium	Essen	1	max. 605 meters	crowded
Netherlands	Roosendaal	1	max. train length 740 meters	
Netherlands	Roosendaal	3	max. train length < 600 meters	
Netherlands	Venlo	10	1 track max. train length 690 meters	parking limitations for dangerous goods
			others < 690 meters	
Germany	Viersen	2	1x612m, 1x700m	sometimes head making for directions Oberhausen
Germany	Cologne	many tracks		various locations, depending on directions (Köln Gremberg, Köln Eifeltor, Köln Ehrenfeld, Köln Kalk, etc.)

BE-NL-DE-3: Antwerp – Roosendaal / Essen – Maastricht / Visé – Bressoux – Aachen West

Country	Location	Number of tracks	Maximum train length	Restrictions
Belgium	Antwerp North	appr. 10	max. 700 meters	
Belgium	Antwerp Schijnpoort	3	max. 776 meters	
Belgium	Essen	1	max. 605 meters	crowded
Netherlands	Roosendaal	1	max. train length 740 meters	
Netherlands	Roosendaal	3	max. train length < 600 meters	
Netherlands	Sittard	4	max. train length 590 - 690 meters	
Belgium	Bressoux	7	min. 650 – max. 850 m	2 tracks necessary for head making
Belgium	Montzen	7	max. 769 meters	
Germany	Aachen West	5	> 700 meters	
Germany	Cologne	many tracks		various locations, depending on directions (Köln Gremberg, Köln Eifeltor, Köln Ehrenfeld, Köln Kalk, etc.)

NL- BE-DE-3: Cologne – Aachen Rothe Erde – Aachen Süd – Hergenrath – Montzen – Antwerp (- Roosendaal – Kijfhoek) (if incident between Aachen West and Montzen)

Country	Location	Number of tracks	Maximum train length	Restrictions
Germany	Cologne	many tracks		various locations, depending on directions (Köln Gremberg, Köln Eifeltor, Köln Ehrenfeld, Köln Kalk, etc.)
Belgium	Hasselt	3	max. 730 meters	
Belgium	Montzen	7	max. 769 meters	
Belgium	Essen	1	max. 605 meters	crowded
Belgium	Antwerp North	appr. 10	max. 700 meters	
Belgium	Antwerp Schijnpoort	3	max. 776 meters	

BE-FR-1: Antwerp – Kortrijk – FR

Country	Location	Number of tracks	Maximum train length	Restrictions
Belgium	Antwerp North	appr. 10	max. 700 meters	
Belgium	Antwerp Schijnpoort	3	max. 776 meters	
Belgium	Gent Zeehaven	3	max. 650 meters	
Belgium	Kortrijk Goederen	1	max. 704 meters	last possibility before border
France	Aulnoye	>3	max. 750 meters	From Monday to Friday
France	Hirson	3	max. 750 meters	
France	Lumes	>3	max. 850 meters	
France	Sedan	2	max. 400 meters	
France	Longuyon	>3	max. 550 meters	
France	Thionville	>3	max. 650 meters	
France	Lille	3	max. 650 meters	Champs de Mars
France	Metz	>3	max. 700 meters	Metz Sablon

BE-LU-FR-1: Antwerp – Luxembourg – FR

Country	Location	Number of tracks	Maximum train length	Restrictions
Belgium	Antwerp North	appr. 10	max. 700 meters	
Belgium	Antwerp Schijnpoort	3	max. 776 meters	
Belgium	Muizen	3	max. 700 meters	
Belgium	Leuven	3	max. 640 meters	
Belgium	Ronet	5	max. 700 meters	
Belgium	Bertrix	2	max. 712 meters	Heavily used
Belgium	Athus	3	max. 800 meters	
France	Longuyon	>3	max. 550 meters	
France	Metz	>3	max. 700 meters	Metz Sablon

2.5.4. Restrictions

Each re-routing option can have specific restrictions which are commented here.

BE-NL-DE-2: Antwerp – Venlo / Kaldenkirchen – Viersen

- No dangerous goods allowed in the Kennedy tunnel in Antwerp. Freight trains with dangerous goods will have a deviation route via Antwerp North and the Antigoon tunnel (Liefkenshoek Rail link). Extra travel time is 15 minutes.
- Capacity on the Infrabel network part is limited.
- The route between Kaldenkirchen and Viersen is a single track, capacity restrictions can occur.
- For destinations to the north trains must change direction in Viersen.
- Trains crossing the border at Venlo may not be longer than 650 meters due to restricted loop sidings in Breyell. In the case of longer trains, a special permit needs to be requested at DB Netz (BZ Duisburg) and at ProRail (LVL-DVL-GD). Special trains for the section Kaldenkirchen – Venlo need to apply at „Servicecenter Sonderfahrplan“ of DB Netz AG in Duisburg. This takes place in coordination with Decentrale Verkeersleiding in Eindhoven.

BE-NL-DE-3: Antwerp – Roosendaal / Essen – Maastrich / Visé – Bressoux – Aachen West

- Profile limitations: P/C 70/400 between Bressoux and Visé.
- No dangerous goods allowed in the Kennedy tunnel in Antwerp. Freight trains with dangerous goods will have a deviation route via Antwerp North and the Antigoon tunnel (Liefkenshoek Rail link). Extra travel time is 15 minutes.
- The trains must change directions in Bressoux.
- Language: on parts of the route (to Montzen) the train driver must be able to speak French.
- Capacity between Eindhoven and Eijsden border and on the Belgian part of the line is limited.

NL-BE-DE-3: Antwerp – Montzen – Hergenrath – Aachen Süd – Aachen Rothe Erde – Cologne (if incident between Montzen and Aachen West)

- Re-routing line can only be used in direction Cologne – Roosendaal – Kijfhoek.
- Capacity limitations Aachen Süd, just 1 train per hour during night (between 22.00 – 5.00 hours).
- Profile limitations (Belgium, Hergenrath): P/C 70/400.
- Capacity between Hergenrath border and Essen border is limited.

BE-FR-1: Antwerp – Kortrijk – FR

- No dangerous goods allowed in the Kennedy tunnel in Antwerp. Freight trains with dangerous goods will have a deviation route via Antwerp North and the Antigoon tunnel (Liefkenshoek Rail link). Extra travel time is 15 minutes.
- Profile limitations (France): Intermodal Gauge C45.
- Crossing over to Germany, Switzerland and Italy is possible at different border points, please see respective tables in subsequent chapters.
- Capacity between Antwerp and Mouscron border is limited.
- Capacity between Metz and St. Louis border is extremely limited. Change of direction necessary in Metz for direction Woippy.

BE-LU-FR-1: Antwerp – Luxemburg – FR

- Weight restriction (Belgium): C166 900t Traxx 1400t in direction South-North.
- No dangerous goods allowed in the Kennedy tunnel in Antwerp. Freight trains with dangerous goods will have a deviation route via Antwerp North and the Antigoon tunnel (Liefkenshoek Rail link). Extra travel time is 15 minutes.
- Capacity between Antwerp and Aubange border is limited. The capacity on the used CFL network is limited. The used SNCF Réseau lines capacity is limited or extremely limited. Between St. Louis border and Basel SBB Muttentz the capacity is also limited.
- Profile limitations (France): Intermodal Gauge C45.
- Crossing over to Germany, Switzerland and Italy is possible at different border points, please see respective tables in subsequent chapters.

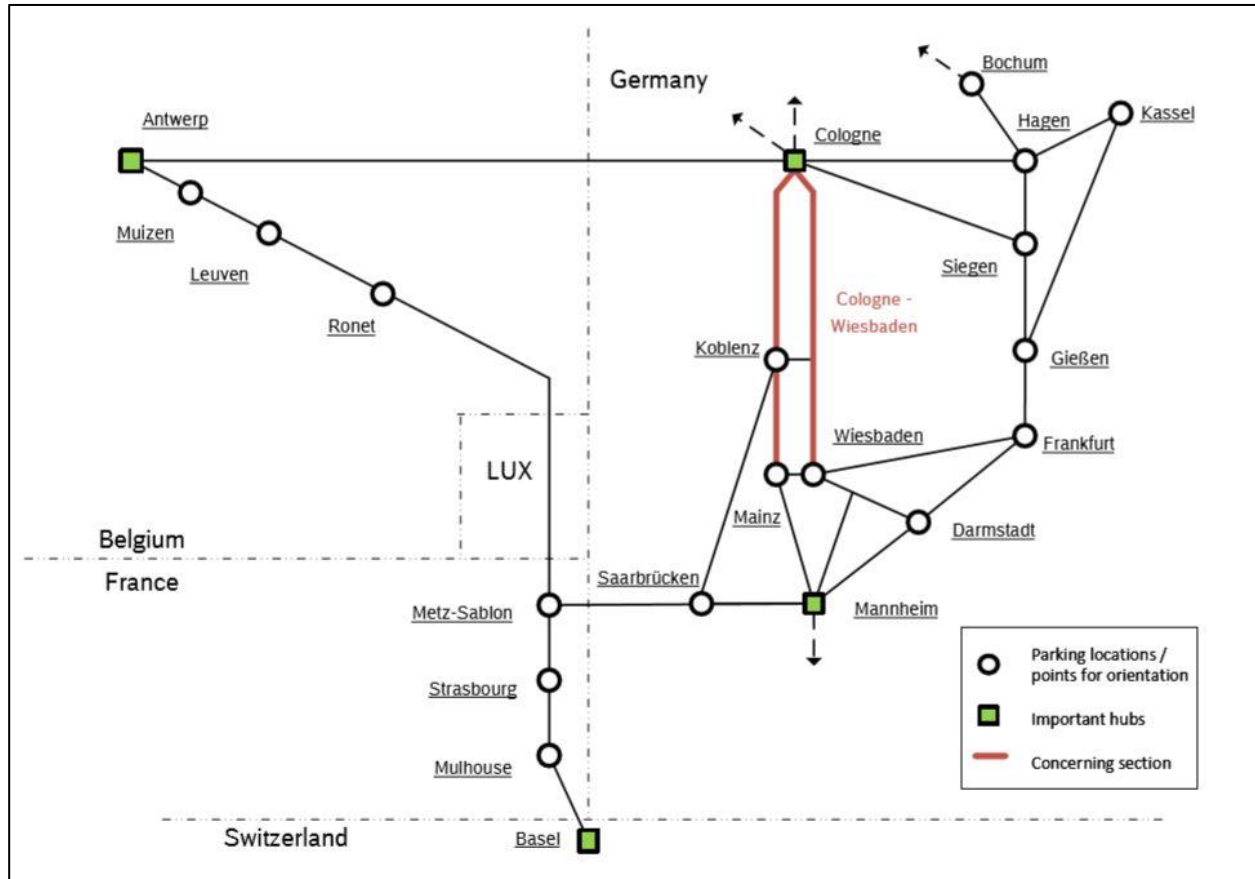
BE-NL-DE-1: Antwerp –Roosendaal / Essen – Kijfhoek – Emmerich – Oberhausen

- No dangerous goods allowed in the Kennedy tunnel in Antwerp. Freight trains with dangerous goods will have a deviation route via Antwerp North and the Antigoon tunnel (Liefkenshoek Rail link). Extra travel time is 15 minutes.
- Capacity between Antwerp and Essen border is limited.

3 Middle Part

3.1. Overview re-routing scenarios middle part

The following section with limited re-routing options is defined for the middle part of RFC Rhine-Alpine.



Cologne - Mainz / Wiesbaden

The left side of the Rhine river is a main railway line that runs along the Middle Rhine from Cologne via Bonn, Koblenz and Bingen to Mainz.

The right side of the Rhine river is the railway line which runs from Troisdorf via Bonn-Beuel, Unkel, Neuwied, Koblenz-Ehrenbreitstein, Lahnstein and Rüdeshheim to Wiesbaden. Both sides are double tracked and electrified continuously.

In Neuwied and Niederrhein it is possible to change to the left side of the Rhine river to reach the Koblenz main station. There are two tunnels situated in the section between Lahnstein and Rüdeshheim, of which the Loreleytunnel near St. Goarshausen is the more popular one.

Left and right side of the Rhine river are good re-routing options for each other. This scenario assumes that both sides of the Rhine river are distorted/blocked.

DE-3.1 Frankfurt – Gießen – Siegen – Cologne

The complete route is electrified (15kV 16,7Hz) and can be used with the signalling system PZB. There are restrictions to the profile that trains can use on this deviation route, with an intermodal freight code of P/C 50 P/C 390 which is lower than the main sections. The maximum weight is lower than on the main section in both directions, with a maximum weight of 1615t in the direction N-S and a maximum weight of 1560t in the direction S-N. There are capacity restrictions on part of the track. There are no further restrictions compared to the main sections.

DE-3.2 Frankfurt – Gießen – Kassel – Dortmund – Cologne

The complete route is electrified (15kV 16,7Hz) and can be used with the signalling system PZB. The maximum weight is lower than on the main section in both directions, with a maximum weight of 1620t in the direction N-S and a maximum weight of 1480t in the direction S-N.

DE-3.3 Mannheim – Saarbrücken – Trier – Koblenz – Cologne

The complete route is electrified (15kV 16,7Hz) and can be used with the signalling system PZB. It has a restriction on the intermodal freight code of P/C 70/400, which is the same as the left side of the Rhine but lower than the right side of the Rhine. There are also restrictions on the maximum weight, with a maximum weight of 1600t in the direction N-S and 1890t in the direction S-N.

DE-3.4 Frankfurt – Gießen – Siegen – Hagen – Oberhausen

The complete route is electrified (15kV 16,7Hz) and can be used with the signalling system PZB. There are restrictions to the profile that trains can use on this deviation route, with an intermodal freight code of P/C 45/375 which is lower than both the main sections and the other re-routing options. The maximum weight is lower than on the main sections in both directions, with a maximum weight of 1400t in the direction N-S and a maximum weight of 1410t in the direction S-N (with an E-Tfz DB 185 as a benchmark).

NL-BE-LU-FR-CH-1: Kijfhoek / Antwerp – Roosendaal/Essen – Luxemburg – FR – Basel

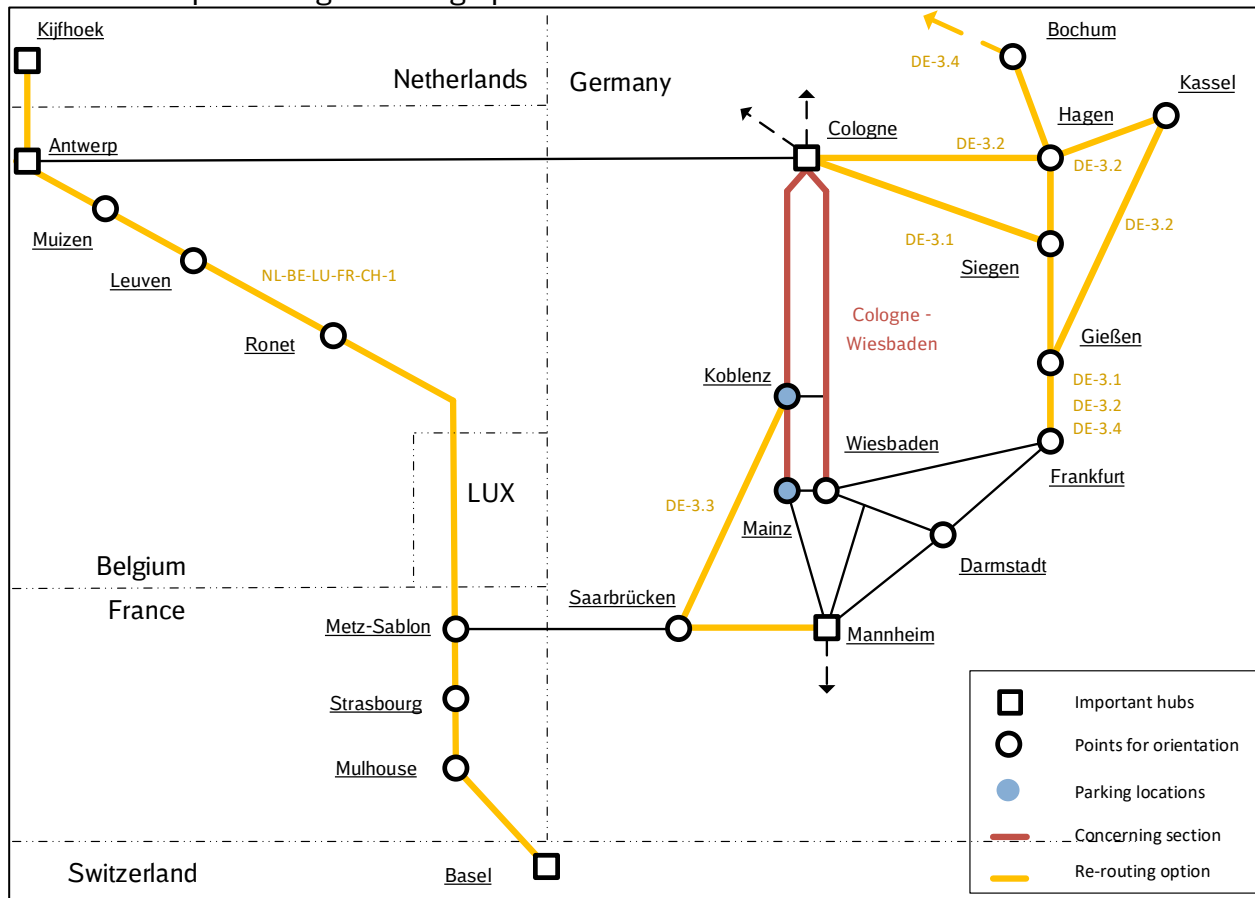
This is an RFC North Sea-Mediterranean main route from the Netherlands via Belgium, Luxembourg and France to Switzerland. Between Kijfhoek – Roosendaal it is a double mixed (passenger and freight trains) track with ATB signalling and 1,5 kV electricity. In Belgium until Roosendaal the route has TBL1+ signalling and 3 kV electricity. In Belgium the route is via Antwerp – Muizen – Leuven – Namur until the French border at Aubange. That route has TBL1+ / ETCS L1 FS and 3 kV. In France the route goes via Woippy / Metz – Strasbourg – Mulhouse to Basel. In France the tracks have 25 kV electricity and KVB signalling.

Between Saint Louis border and Basel Muttentz, the intermodal freight code is given with EBV 1 / C25/344 / C45/353 / B45/353. However, there is an annual AS-eeee-0945 (Extraordinary shipments), in which this track is recorded. According to this, consignments C45 / 353, B45 / 353, WoodTainer and other shipments are possible.

3.2. Re-routing scenario for section Cologne – Mainz / Wiesbaden

3.2.1. General description

Schematic map including re-routing options.



When the section Cologne – Mainz / Wiesbaden is blocked the re-routing options are:

Section ID	Usability	Route
DE-3.1	tbd	Frankfurt – Gießen – Siegen – Cologne
DE-3.2	tbd	Frankfurt – Gießen – Kassel – Dortmund – Cologne
DE-3.3	tbd	Mannheim – Saarbrücken – Trier – Koblenz – Cologne
DE-3.4	tbd	Frankfurt – Gießen – Siegen – Hagen – Oberhausen
NL-BE-LU-FR-CH-1	B	Kijfhoek / Antwerp – Roosendaal/Essen – Luxemburg – FR – Basel

Regarding Section NL-BE-LU-FR-CH-1 it is also possible to cross from Strasbourg via Kehl to Offenburg.

3.2.2. Parameters of re-routing options including capacity indication

IM	Line section	Usage		Traction power	Train length	Line category	Number of tracks	Gradient	Gauge	Intermodal freight code	Signalling	Speed	Length of re-routing option	Weight	Miscellaneous	Capacity Indication
		Pass	Frei													
Section: left/right Rhine																
DB Netz	Left side Rhine river (Mainz – Cologne)	x	x	AC 15 kV 16,7 Hz	740	D4	2	N/A	Upon request	P/C 70/400	PZB	160	185	N-S:2515t, S-N:2805t (DB-185)		Good
DB Netz	Right side Rhine river (Wiesbaden – Cologne)	x	x	AC 15 kV 16,7 Hz	740	D4	2	N/A	Upon request	P/C 80/410	PZB	160	178	N-S:2790t S-N:2600t (DB-185)		Good
DE-3.1: Frankfurt – Gießen – Siegen - Cologne																
DB Netz	Frankfurt – Gießen – Siegen - Cologne	x	x	AC 15 kV 16,7Hz	740	D4	2	N/A	Upon request	P/C 70 P/C 390	PZB	160	271	N-S:1615t S-N:1560t		Excellent
DE-3.2: Frankfurt – Gießen – Kassel – Dortmund - Cologne																
DB Netz	Frankfurt – Gießen – Kassel – Dortmund - Cologne	x	x	AC 15 kV 16,7Hz	740	D4	2	N/A		P/C 80/410	PZB	160	551	N-S:1620t S-N:1480t		Excellent
DE-3.3: Mannheim – Saarbrücken – Trier – Koblenz - Cologne																
DB Netz	Mannheim – Saarbrücken – Trier – Koblenz - Cologne	x	x	AC 15 kV 16,7Hz	740	D4	2	N/A		P/C 70/400	PZB	120	423	N-S:1600t S-N:1890t (DB 185)		Good
DE-3.4: Frankfurt – Gießen – Siegen - Hagen - Oberhausen																
DB Netz	Frankfurt - Gießen - Siegen - Hagen - Oberhausen	x	x	AC 15 kV 16,7Hz	740	D4	2	N/A	Upon request	P/C 45 P/C375	PZB	100-160		N-S: 1410t S-N: 1400t		Excellent
NL-BE-LU-FR-CH-1: Kijfhoek / Antwerp – Roosendaal/Essen – Luxemburg – FR – Basel																
ProRail	Kijfhoek - Roosendaal border	x	x	1.5 kV DC	740	D4	2	N/A	G2	P/C 80/410	ATB EG	100	42,7	2100-2400		Good, 740 m limited
Infrabel	Antwerp - Essen border	x	x	3kv	740	D4	2	N/A	GB	P/C 70/400	TBL1+	100	23	2200-2470	no dangerous goods allowed in the Kennedy tunnel in Antwerp Re-routing via Antwerp North and Antigoon Tunnel possible	Limited
Infrabel	Antwerp - Ronet - Aubange (border LUX)	x	x	3kv	740	D4	2	N/A	GB	PC 70/400	ETCS L1 FS TBL1+	100	283	N-S: 1200 (Diesel), 1600 (Electric) S-N: 900 (Diesel), 1400 (Electric)	Between Antwerpen Luchtbal and Lier = comprehensive network no dangerous goods allowed in the Kennedy tunnel in Antwerp Re-routing via Antwerp North and Antigoon Tunnel possible	Limited
CFL	Rodange - Esch-sur-Alzette - Bettembourg		x	25 kV	750	D4	2	≤ 19‰	GB - C50	Upon request	ETCS Level 1	90		D4		Limited
SNCF Réseau	LUX border - Metz-Sablon - Strasbourg - Mulhouse - Saint Louis border	x	x	25kv AC	750	D4	2	< 12,5‰	GB1	C45	KVB	121-160 km/h		D4		limited - extremely limited
SBB	Saint Louis border – Basel RB Muttentz	x	x	25kV / 15 kV AC	750	D4	2	7‰	EBV 1	EBV 1 / C25/344, C45 / 353, 845 / 353	KVB L1LS - 3.4.0	100	9	2000	several intermodal freight codes possible due to the annual AS-eeee-0945	Limited

3.2.3. Parking locations & capacity

Country	Location	Number of tracks	Maximum train length	Restrictions
Germany	Koblenz-Lützel Mitte	3	~ 600 meters	
Germany	Koblenz-Lützel Mitte	1	~ 500 meters	
Germany	Mainz-Bischofsheim	3	~ 600 meters	
Germany	Mainz-Bischofsheim	1	740 meters	
Germany	Basel Bad. Bf	5	max. 650 meters	capacity very limited
Belgium	Antwerp North	appr. 10	max. 700 meters	
Belgium	Antwerp Schijnpoort	3	max. 776 meters	
Belgium	Gent Zeehaven	3	max. 650 meters	
Belgium	Muizen	3	max. 700 meters	
Belgium	Leuven	3	max. 640 meters	
Belgium	Ronet	5	max. 700 meters	
Belgium	Bertrix	2	max. 712 meters	Heavily used
Belgium	Athus	3	max. 800 meters	
France	Longuyon	>3	max. 550 meters	
France	Metz	>3	max. 700 meters	Metz Sablon
France	Strasbourg	>3	max. 750 meters	Hausbergen (railway modernization)
France	Mulhouse	5	max. 750 meters	
Switzerland	Basel SBB RB	4	max. 650 meters	

Parking capacity outside concerning route section:

- DB Netz region Mitte: 18 trains

3.2.4. Restrictions

Each re-routing option can have specific restrictions which are commented here.

NL-BE-LU-FR-CH-1: Kijfhoek / Antwerp - Roosendaal/Essen - Luxemburg - FR - Basel

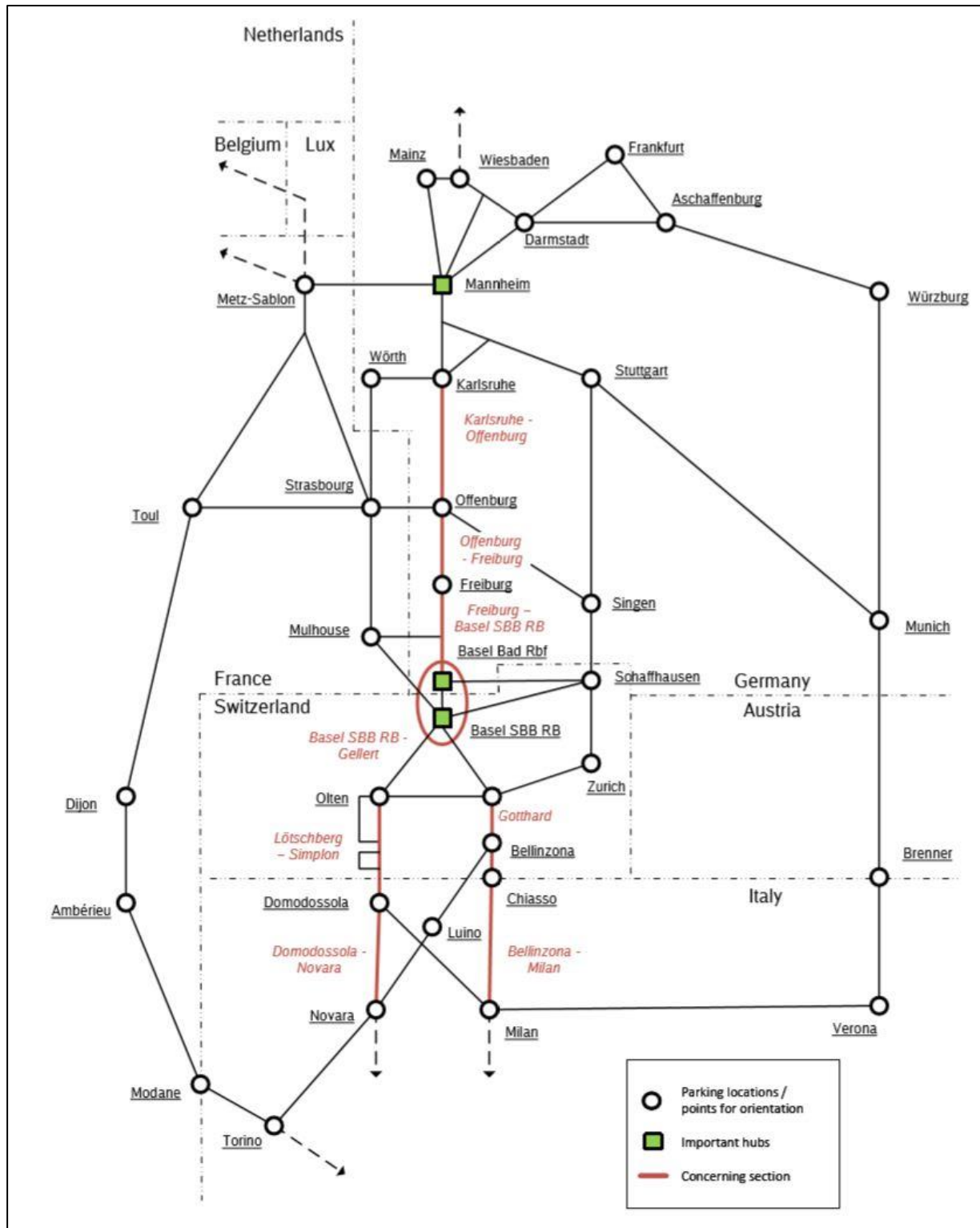
- Weight restriction (Belgium): CI66 900t Traxx 1400t in direction South - North.
- No dangerous goods allowed in the Kennedy tunnel in Antwerp. Freight trains with dangerous goods will have a deviation route via Antwerp North and the Antigoon tunnel (Liefkenshoek Rail link). Extra travel time is 15 minutes.
- Profile limitations (France): Intermodal Gauge C45.

The capacity on the SNCF network part is extremely limited. For the Infrabel, CFL and SBB network part the capacity is limited.

4 Southern Part

4.1. Overview re-routing scenarios southern part

The following sections with limited re-routing options are defined for the southern part of RFC Rhine-Alpine.



Some re-routing options can be used for various sections. In chapter 4.2. the re-routing options per section are shown.

For the southern part of the RFC Rhine-Alpine, the following sections are defined:

Section ID	Route
DE-14	Karlsruhe - Offenburg
DE-CH-IT-1	Offenburg - Freiburg
DE-CH-IT-1	Freiburg - Basel SBB RB
DE-CH-1	Basel SBB RB - Gellert (Rhine bridge)
CH-2	Lötschberg-Simplon <i>and</i> Gotthard (base tunnel)
IT-1	Domodossola - Novara
IT-2	Bellinzona - Milan

On the southern part of RFC Rhine-Alpine the following routes can be used for rail freight operations. These routes can be used as re-routing options, depending on the line section where an incident happens. Chapter 4.2 below describes scenarios for sections with limited re-routing possibilities.

Section ID	Route
NL-BE-LU-FR-CH-1	Kijfhoek / Antwerp - Roosendaal/Essen - Luxemburg - FR - Basel
DE-FR-CH-1 (b1) DE-FR -1 (b2)	Karlsruhe - Wörth - Strasbourg - Basel (b1) / Offenburg (b2)
DE-CH-2	Mannheim - Stuttgart - Singen - Zurich
DE-FR-CH-2 (d1) DE-FR-2 (d2)	Mannheim - Metz - Strasbourg - Basel (d1) / Offenburg (d2)
DE-AT-IT-2	Mannheim - Stuttgart - Munich - Verona (Brenner / Salzburg) - Milan Smistamento
DE-AT-IT-3	Wiesbaden - Frankfurt - Aschaffenburg - Würzburg - Munich - Verona (Brenner / Salzburg) - Milan Smistamento
DE-CH-3	Offenburg - Singen - Zurich
DE-FR-CH-3	Müllheim - Mulhouse - Basel
CH-1	Via Basel SBB passenger station (change of direction) ¹
CH-IT-1	Basel - Gotthard - Bellinzona - Novara
CH-3	Thun - Kandersteg - Brig (Lötschberg Mountain route)
DE-FR-IT-1	Offenburg - Strasbourg - Réding - Toul - Dijon - Ambérieu - Modane - Torino - Novara / Alessandria
BE-FR-IT-1	Antwerp - Mouscron - Lille - Thionville - Metz - Toul - Dijon - Ambérieu - Modane - Torino - Novara / Alessandria
BE-FR-LU-IT-1	Antwerp - Ronet - Rodange - Bettembourg - Metz - Toul - Dijon - Ambérieu - Modane - Torino - Novara / Alessandria
IT-4	Domodossola - Arona - Novara
CH-IT-2	Basel - Domodossola - Milan
CH-IT-3	Bellinzona - Gallarate - Milan

NL-BE-LU-FR-CH-1: Kijfhoek / Antwerp – Roosendaal/Essen – Luxemburg – FR – Basel

This is the main route from the Netherlands to and from Belgium. Between Kijfhoek – Roosendaal it is a double mixed (passenger and freight trains) track with ATB signalling and 1,5 kV electricity. In Belgium until Roosendaal the route has TBL1+ signalling and 3 kV electricity. In Belgium the route from Antwerp via Ronet until the Luxemburg border at Aubange has TBL1+, ETCS L1 FS and 3 kV. From Aubange the Luxemburg line is equipped with Memor 2+, ETCS L1 FS and 25 kV. In France the route goes via Woippy / Metz – Strasbourg – Mulhouse to Basel. In France the tracks have 25 kV electricity and KVB signalling.

Between Saint Louis border and Basel Muttentz, the intermodal freight code is given with EBV 1 / C25/344. However, there is an annual AS-eeee-0945 (Extraordinary shipments), in which this track is recorded. According to this, consignments C45 / 353, B45 / 353, WoodTainer and other shipments are possible.

DE-FR-CH-1 (b1) / DE-FR -1 (b2): Karlsruhe – Wörth – Strasbourg – Basel (b1) / Offenburg (b2)

The part from Wörth to Strasbourg is a French-German railway line in the French region of Grand Est and the German state of Rhineland-Palatinate. It is not electrified and a mixed freight and passenger line. North of Lauterbourg there is only single track. The Strasbourg-Basel line is an electrified double track line. Trains must change direction in Wörth and Hausbergen.

If the incident is between Karlsruhe and Offenburg, trains can be diverted via Strasbourg and then to Offenburg again (b2). The line between Strasbourg and Offenburg is a double-track line.

DE-CH-2: Mannheim – Stuttgart – Singen – Zurich

Between Karlsruhe and Stuttgart in the German state of Baden-Württemberg the double track line is electrified and used by passenger and freight trains (with PZB and 15 kV). The so called Gäubahn (Stuttgart – Singen) is electrified but is between Horb and Hattingen single track. Due to that and the fact that it is used for regional and long-distance passenger services and freight trains, the use of capacity is already very high. An upgrade is planned. The part from Singen to Zurich is electrified but partly one track (Neuhausen-Jestetten, Jestetten-Rafz and Hüntwangen-Eglisau). The Swiss part to Zurich is electrified with 15 kV.

DE-FR-CH-2 (d1) / DE-FR-2 (d2): Mannheim – Metz – Strasbourg – Basel (d1) / Offenburg (d2)

The whole route is electrified (15 kV or 25kV). Between Mannheim and Saarbrücken the line is a part of an international east-west axis which connects the German states Saarland, Rhineland-Palatinate and Baden-Württemberg. The French-German line between Saarbrücken, Forbach (border) and Metz is the connection to the main route Paris-Strasbourg. For the stretch to Offenburg, the Rhine river has to be crossed via Kehl to get back to the Germany. For the stretch to Basel the route follows the Alsace south to Basel. In France, electrification is 25 kV and signaling KVB. Signaling from Saint Louis to Basel SBB RB is KVB/L1LS - 3.4.0.

DE-AT-IT-2: Mannheim – Stuttgart – Munich – Verona (Brenner / Salzburg) – Milan Smistamento

Between Karlsruhe and Stuttgart in the German state of Baden-Württemberg, the double track line is electrified and used by passenger and freight trains (with PZB and 15 kV). Between Augsburg and Munich, there are two parallel double track lines. Then the route follows the Inn valley to Innsbruck where the Brenner mountain line starts. Signalling at the Brenner mountain line is PZB and ETCS level 2. Attention should be paid to restrictions regarding weight (700t) on this section. In Italy the line follows the Etsch valley to Verona. In Italy the route is electrified with 3 kV and SCMT signalling.

DE-AT-IT-3: Wiesbaden – Frankfurt – Aschaffenburg – Würzburg – Munich – Verona (Brenner / Salzburg) – Milan Smistamento

The complete route is electrified (in Germany and Austria with 15kV 16,7Hz, in Italy with 3kV) and can be used with the signalling system PZB (in GER and AT), ETCS 2 (in AT) and BACC/SCMT (in IT). The maximum weight is lower than on the main section in both directions, with a maximum weight of 1600t in the direction N-S and a maximum weight of 1910t in the direction S-N (with an E-Tfz DB 185 as a benchmark). There are further possible paths freight traffic can use between Aschaffenburg and Munich.

DE-CH-3: Offenburg – Singen – Zurich

The whole route is electrified with 15 kV 16,7 Hz. Signalling on the German part is PZB, in Switzerland L1LS - 3.4.0 (operable with P44). Between Offenburg and Singen the so called Schwarzwaldbahn passes a mountainous region. Gradient is less than 20‰. The part from Zurich to Schaffhausen is partly one track (Neuhausen-Jestetten, Jestetten-Rafz and Hüntwangen-Eglisau).

DE-FR-CH-3: Müllheim – Mulhouse – Basel

The route between Müllheim and Mulhouse is single track but electrified (German part with 15 kV 16,7 Hz and PZB signalling, French part with 25 kV and KVB). Between Mulhouse and Basel, it is a double track line with 25 kV and KVB signalling. In Switzerland signalling is L1LS - 3.4.0 (operable with P44). As no curve exists on the route from Müllheim to Basel, the deviation route from Müllheim only runs directly to Freiburg. The route from Müllheim to Basel is therefore only feasible with a change of directions.

CH-1: Via Basel SBB passenger station (change direction)¹

Direction and locomotive must be changed. This process is complicated.

CH-3: Thun – Kandersteg – Brig (Lötschberg Mountain route)

This re-routing option via the Lötschberg mountain line has only one track available for P/C 80/405. It is accessible with an additional locomotive or limited weight.

DE-FR-IT-1: Offenburg – Strasbourg – Réding – Toul – Dijon – Ambérieu – Modane – Torino – Novara / Alessandria

This re-routing option runs mainly on RFC 2 and RFC 6. Capacity restrictions may occur between Nancy and Strasbourg, especially in the area of Réding. Also, various infrastructure works in France may limit capacity.

BE-FR-IT-1: Antwerp – Mouscron – Lille – Thionville – Metz – Toul – Dijon – Ambérieu – Modane – Torino – Novara / Alessandria

This re-routing option runs mainly on RFC 2 and RFC 6 and serves as a complete alternative for routes from the Netherlands / Belgium to Italy. Various infrastructure works in France may limit capacity.

¹ Only a re-routing option if incident at Basel SBB RB.

BE-FR-LU-IT-1: Antwerp – Ronet – Rodange – Bettembourg – Metz – Toul – Dijon – Ambérieu – Modane – Torino – Novara / Alessandria

This re-routing option runs mainly on RFC 2 and RFC 6 and serves as a complete alternative for routes from the Netherlands / Belgium to Italy. Various infrastructure works in France may limit capacity.

CH-IT-1: Basel – Gotthard – Bellinzona – Novara

Currently the profile is P/C50 on the Italian part (Luino – Gallarate – Rho – Milano Rogoredo).

IT-4: Domodossola – Arona – Novara

Signalling is SCMT. Domodossola to Arona is double track. Arona to Novara is single track. The whole route is electrified (3 kV). The maximum train length is 510/540 meters and profile limitation is P/C45. Max. train weight is 1600.

CH-IT-2: Basel – Domodossola – Milan

The signalling of the Swiss network is ETCS L1LS - 3.4.0 (operable with P44) and partly L2 SRS 2.3.0d (Lötschberg Base Tunnel) including the border sections to the stations Domodossola and Luino which are already part of the Italian network. The residual lines in northern Italy are equipped with SCMT. ETCS L2 lines are taken into use from mid-2018 on. The maximum train length is 750 meters (Basel – Domodossola) and 600m (Domodossola – Milan). Profile limitation is P/C45 (Domodossola – Milan).

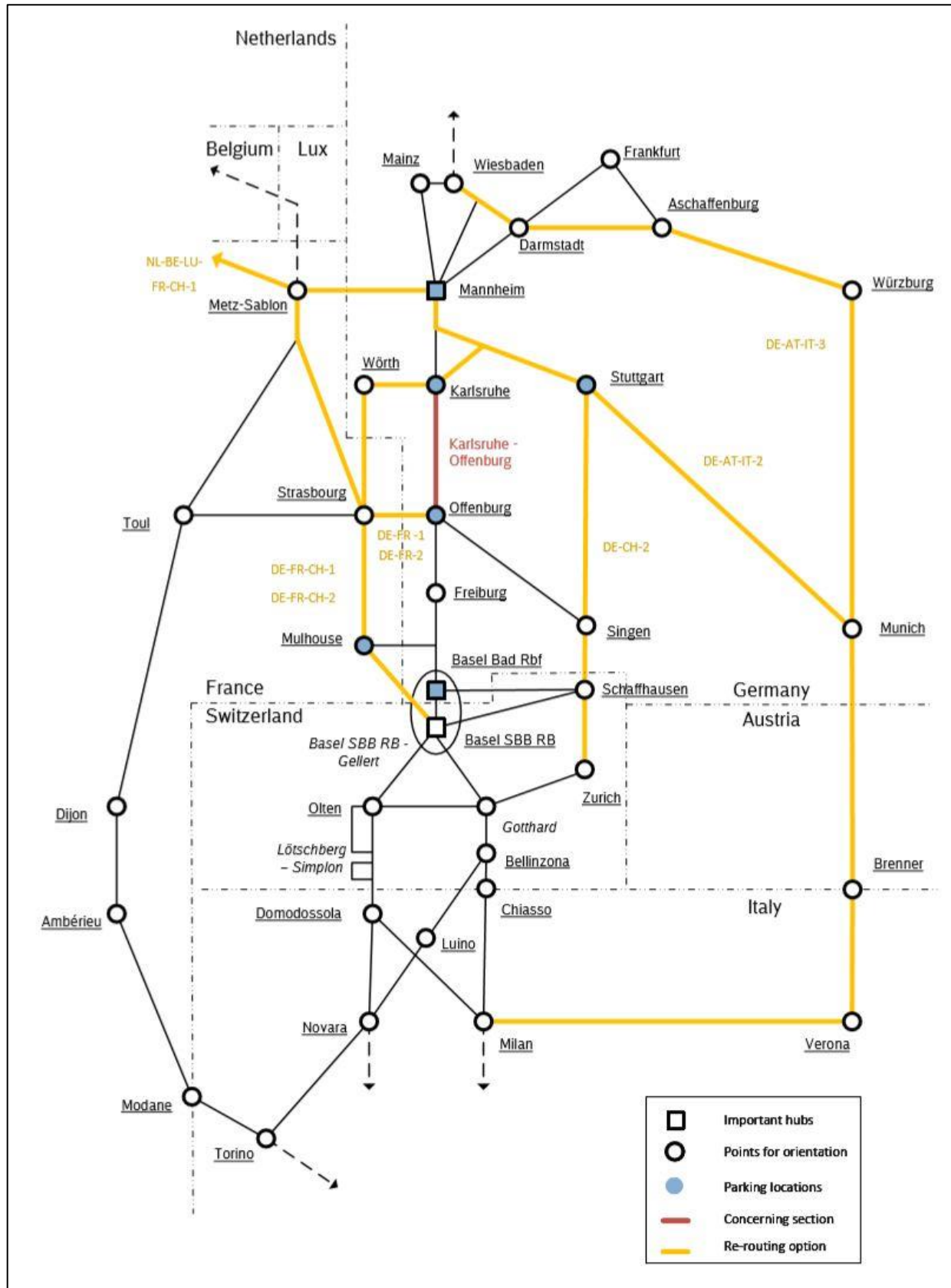
CH-IT-3: Bellinzona – Gallarate – Milan

This is a double track line. The section between Luino – Bellinzona is a single-track line. The profile P/C45 (Luino-Milan) does not allow high profile traffic like rolling highway. Train length is 600 meters, only some tracks are available for 750-meter trains.

4.2. Re-routing scenario for section Karlsruhe – Offenburg

4.2.1. General description

Schematic map including re-routing options.



When the section Karlsruhe - Offenburg is blocked the re-routing options are:

Section ID	Usability	Route
NL-BE-LU-FR-CH-1	B	Kijfhoek / Antwerp - Roosendaal/Essen - Luxemburg - FR - Basel
DE-FR-CH-1 (b1) DE-FR-1 (b2)	C	Karlsruhe - Wörth - Strasbourg - Basel (b1) / Offenburg (b2)
DE-CH-2	B	Karlsruhe - Stuttgart - Singen - Zurich
DE-FR-CH-2 (d1) DE-FR-2 (d2)	C	Mannheim - Metz - Strasbourg - Basel (d1) / Offenburg (d2)
DE-AT-IT-2	B	Mannheim - Stuttgart - Munich - Verona (Brenner / Salzburg) - Milan Smistamento
DE-AT-IT-3	tbd	Wiesbaden - Frankfurt - Aschaffenburg - Würzburg - Munich - Verona (Brenner / Salzburg) - Milan Smistamento

4.2.2 Parameters of re-routing options including capacity indication

IM	Line section	Usage		Traction power	Train length	Line category	Number of tracks	Gradient	Gauge	Intermodal freight code	Signalling	Speed	Length of re-routing option	Weight	Miscellaneous	Capacity Indication
		Pass	Freight													
Section: Karlsruhe - Offenburg																
DB Netz	Karlsruhe - Offenburg	x	x	AC 15 kV 16,7Hz	740	D4	2 to 4	5-10‰	GC	P/C 70/400	PZB LZB (4000 PZB only)	Up to 250	72	2645-2805	Limited	
NL-BE-LU-FR-CH-1: Kijfhoek / Antwerp – Roosendaal/Essen – Luxemburg – FR – Basel																
ProRail	Kijfhoek - Roosendaal border	x	x	1.5 kV DC	740	D4	2	N/A	G2	P/C 80/410	ATB EG	100	42,7	2100-2400		Good, 740 m limited
Infrabel	Antwerp - Essen border	x	x	3kv	740	D4	2	N/A	GB	P/C 70/400	TBL1+	100	23	2200-2470	no dangerous goods allowed in the Kennedy tunnel in Antwerp Re-routing via Antwerp North and Antigoon Tunnel possible	Limited
Infrabel	Antwerp - Ronet - Aubange (border LUX)	x	x	3kv	740	D4	2	N/A	GB	PC 70/400	ETCS L1 FS TBL1+	100	283	N-S: 1200 (Diesel), 1600 (Electric) S-N: 900 (Diesel), 1400 (Electric)	Between Antwerpen Luchtbal and Lier = comprehensive network no dangerous goods allowed in the Kennedy tunnel in Antwerp Re-routing via Antwerp North and Antigoon Tunnel possible	Limited
CFL	Rodange - Esch-sur-Alsette - Bettembourg		x	25 kV	750	D4	2	≤ 19‰	GB - C50	Upon request	ETCS Level 1	90		D4		Limited
SNCF Réseau	LUX border - Metz-Sablon - Strasbourg - Mulhouse - Saint Louis border	x	x	25kv AC	750	D4	2	< 12,5‰	GB1	C45	KVB	121-160 km/h		D4		limited - extremely limited
SBB	Saint Louis border – Basel RB Muttentz	x	x	25kV / 15 kV AC	750	D4	2	7‰	EBV 1	EBV 1 / C25/344, C45 / 353, B45 / 353	KVB L1LS - 3.4.0	100	9	2000	several intermodal freight codes possible due to the annual AS-eeee-0945	Limited
DE-FR-CH-1 (b1) / DE-FR -1 (b2): Karlsruhe - Wörth - Strasbourg – Basel (b1) / Offenburg (b2)																
DB Netz	Karlsruhe Gbf - Wörth	x	x	AC 15 kV 16,7Hz		D4	2	N/A	GA	P/C 80/410	PZB	120	11	3030-3045 (V-Tfz DB – 232/233)	Karlsruhe <-> France, change of direction in Wörth	Limited
DB Netz	Wörth - Lauterbourg (border)	x	x	Diesel	600	D4	1	N/A	Upon request	P/C 80/410	PZB	100	11	3030-3945 (V-Tfz DB 232/233)	Karlsruhe <-> France, change of direction in Wörth	Extremely limited
SNCF Réseau	Lauterbourg border - Strasbourg	x	x	Diesel	750	D4	2	< 12,5‰	GB1	C45	No speed control system	61-100 km/h	58	D4	Karlsruhe - Basel: change of direction in Hausbergen Night closure between 21:00 and 06:00 hours Limited capacity in Lauterbourg between 06:00 -21:00 hours	Good
SNCF Réseau	Strasbourg - Mulhouse	x	x	25kv AC	750	D4	2	< 12,5‰	GB1	C45	KVB	161-220km/h	107	D4		Extremely limited
SNCF Réseau	Mulhouse - Saint Louis (border)	x	x	25kv AC	750	D4	2	< 12,5‰	GB	C45	KVB	121-160 km/h	28	D4		Limited
SBB	Saint Louis border – Basel RB Muttentz	x	x	25kV / 15 kV AC	750	D4	2	7‰	EBV 1	EBV 1 / C25/344, C45 / 353, B45 / 353	KVB L1LS - 3.4.0	100	9	2000	several intermodal freight codes possible due to the annual AS-eeee-0945	Limited
SNCF Réseau	Lauterbourg border - Strasbourg	x	x	Diesel	750	D4	2	< 12,5‰	GB1	C45	No speed control system	61-100 km/h	58	D4	Karlsruhe - Basel: change of direction in Hausbergen Night closure between 21:00 and 06:00 hours Limited capacity in Lauterbourg between 06:00 -21:00 hours	Good
DB Netz	Kehl - Appenweier (Offenburg)	x	x	AC 15 kV 16,7Hz	740	D4	2	N/A	Upon request	P/C 80/410	PZB	160	14			Good

IM	Line section	Usage		Traction power	Train length	Line category	Number of tracks	Gradient	Gauge	Intermodal freight code	Signalling	Speed	Length of re-routing option	Weight	Miscellaneous	Capacity Indication
		Pass	Freight													
DE-CH-2: Mannheim - Stuttgart - Singen - Zurich																
DB Netz	(Mannheim -) Kornwestheim- Singen	x	x	AC 15 kV 16,7Hz	580	D4	1	<20‰	Upon request	P/C 65/395	P2B	100	276	1245-1640	Change of direction in Singen; partly single track	Limited Extremely limited
DB Netz	Singen - Schaffhausen	x	x	AC 15 kV 16,7Hz	580	D4	2	N/A	Upon request	P/C 70/400	P2B	160	20	1: 3130t 2: 2275t		Limited
SBB	Schaffhausen (border) - Zurich Oerlikon	x	x	AC 15 kV 16,7Hz	750	D4	2	10‰	EBV 2, includes UIC G1	P/C 60/384	L1 LS 3.4.0	100	52	22,5 t	Some part one track only	Good
DE-FR-CH-2 (d1) / DE-FR-2 (d2): Mannheim – Metz – Strasbourg – Basel (d1) / Offenburg (d2)																
DB Netz	Mannheim - Kaiserslautern - Saarbrücken - Forbach border	x	x	AC 15 kV 16,7 Hz	740	D4	2 to 4	<20‰	GA	P/C 70/400	P2B	Up to 160	135	1890-1935		Good
SNCF Réseau	Forbach (border) - Metz	x	x	25kv AC	750	D4	2	<12,5‰	GB1	C45	KVB	121-160 km/h	75	D4		Good
SNCF Réseau	Metz - Réding	x	x	25kv AC	750	D4	2	<12,5‰	GB1	C45	KVB	121-160 km/h	86	D4		Limited
SNCF Réseau	Réding - Strasbourg	x	x	25kv AC	750	D4	2	<12,5‰	GB	C45	KVB	121-160 km/h	68	D4		Limited
SNCF Réseau	Strasbourg - Mulhouse	x	x	25kv AC	750	D4	2	<12,5‰	GB1	C45	KVB	161-220km/h	107	D4		Extremely limited
SNCF Réseau	Mulhouse - Saint Louis (border)	x	x	25kv AC	750	D4	2	<12,5‰	GB	C45	KVB	121-160 km/h	28	D4		Limited
SBB	Saint Louis border – Basel RB Muttentz	x	x	25kV / 15 kV AC	750	D4	2	7‰	EBV 1	EBV 1 / C25/344, C45 / 353, B45 / 353	KVB L1LS - 3.4.0	100	9	2000	several intermodal freight codes possible due to the annual AS-eeee-0945	Limited
SNCF Réseau	Strasbourg-Offenburg	x	x	25kv AC	750	D4	2	<12,5‰	GB1	C45	No speed control system	101-120km/h	5	D4		Excellent
DB Netz	Kehl - Appenweiler (Offenburg)	x	x	AC 15 kV 16,7Hz	740	D4	2	N/A	Upon request	P/C 80/410	P2B	160	14			Good
DE-AT-IT-2: Mannheim - Stuttgart - Munich - Verona (Brenner/Salzburg) – Milan SM																
DB Netz	(Mannheim - Mülacker - Ludwigsburg - Kornwestheim - Ulm - Augsburg Hbf -) München - Rosenheim - Kufstein	x	x	AC 15 kV 16,7Hz	600 Standard Train (DB Loco 185)	D4	2	≤15‰	Upon request	P/C 80/410	P2B	160	460	With Loco DB 185: Ma-Ku: 2.700 Ku-Ma: 2.530		Good
ÖBB	Kufstein - Wörgl - Hall i. T. - Innsbruck - Brenner	x	x	15 kV 16,7 Hz	600 RFC 3: 600-649	22,5t (8,0t/m) RFC 3: D4	2	0‰-30‰	GA, G1 und G2 RFC 3: GB&G2	P/C 80/410	P2B, ETCS 2 RFC 3: P2B	130 RFC 3: 80-130		700 t (one loco 1216)	Contact ÖBB	
RFI	Brenner – Verona – Milano SM	x	x	3 kV	600	D4L	2	20‰-25‰ for , Brennero - Bivio/P.C. S. Massimo 5‰-10‰ for Verona RFC 6: 6-10‰ for Verona- Milano	upon request	P/C 80/410	BACC/SCMT	100	371	1600 2500 under specific conditions for incoming trains		Extremely limited
DE-AT-IT-3: Wiesbaden - Frankfurt - Aschaffenburg – Würzburg – Munich – Verona (Brenner / Salzburg) – Milan Smistamento																
DB Netz	Aschaffenburg - Gemünden - Würzburg - Ansbach - Donauwörth - Augsburg - Munich - Kufstein	x	x	AC 15 kV 16,7Hz	640	D4	2	≤20‰	Upon request	P/C 80 P/C 410	P2B	Up to 160		N-S: 1600t S-N: 1910t	further possible freight paths between Aschaffenburg and Munich	Good
ÖBB	Kufstein - Wörgl - Hall i. T. - Innsbruck - Brenner	x	x	15 kV 16,7 Hz	600 RFC 3: 600-649	22,5t (8,0t/m) RFC 3: D4	2	0‰-30‰	GA, G1 und G2 RFC 3: GB&G2	P/C 80/410	P2B, ETCS 2 RFC 3: P2B	130 RFC 3: 80-130		700 t (one loco 1216)	Contact ÖBB	
RFI	Brenner – Verona – Milano SM	x	x	3 kV	600	D4L	2	20‰-25‰ for , Brennero - Bivio/P.C. S. Massimo 5‰-10‰ for Verona RFC 6: 6-10‰ for Verona- Milano	upon request	P/C 80/410	BACC/SCMT	100	371	1600 2500 under specific conditions for incoming trains		Extremely limited

4.2.3 Parking locations & capacity

Country	Location	Number of tracks	Maximum train length	Restrictions
Germany	Area Mannheim	6-7	max. 700 meters	
Germany	Karlsruhe	1-2	max. 700 meters	
Germany	Stuttgart	4	max. 700 meters	
Germany	Offenburg	2	ca. 700 meters	
Germany	Basel Bad. Bf	5	max. 650 meters	capacity very limited
France	Mulhouse	5	max. 750 meters	
France	Metz	>3	max. 700 meters	Metz Sablon
France	Strasbourg	>3	max. 750 meters	Hausbergen (railway modernization)
Switzerland ²	Basel SBB RB	4	max. 650 meters	

Information on additional parking locations in The Netherlands, Belgium and France is given in the northern part scenarios in chapter 2.

4.2.4 Restrictions

Each re-routing option can have specific restrictions which are commented here.

NL-BE-LU-FR-CH-1: Kijfhoek / Antwerp - Roosendaal/Essen - Luxemburg - FR - Basel

- Weight restriction (Belgium): CI66 900t Traxx 1400t.
- No dangerous goods allowed in the Kennedy tunnel in Antwerp. Freight trains with dangerous goods will have a deviation route via Antwerp North and the Antigoon tunnel (Liefkenshoek Rail link). Extra travel time is 15 minutes.
- Profile limitations (France): Intermodal Gauge C45.
- The whole line despite the ProRail part is limited in capacity. Extreme limitations on the SNCF part.

DE-FR-CH-1 (b1) / DE-FR -1 (b2): Karlsruhe - Wörth - Strasbourg - Basel (b1) / Offenburg (b2)

- Track between Wörth and Strasbourg / Hausbergen is not electrified, only diesel traction is possible.
- Single track between Wörth - Lauterbourg: No turnouts on single track line.
- Change of direction in Wörth.
- Night closure of track between 21.00 hours and 6.00 hours.
- Capacity limitations in Wörth (track length and occupancy).
- Limited capacity in Lauterbourg between 6.00 - 21.00 hours due to at grade platform access. Between Lauterbourg and Wörth capacity is extremely limited.
- Profile limitations: Intermodal Gauge C45 (mainly Strasbourg).

² In case of an incident in Switzerland trains running north must park at terminals / tracks in Italy. Parking locations in Switzerland itself are very limited.

- Change of direction in Hausbergen.
- Capacity limitations between 6.00 – 21.00 hours due to Strasbourg passenger station.
- Extremely limited capacity between Strasbourg and Mulhouse.
- Capacity limitations in Kehl (no change of driver or locomotive).

DE-CH-2: Karlsruhe – Stuttgart – Singen – Zurich

- Partly single track between Stuttgart – Singen and Singen – Zurich.
- Train weight limitations because of gradient and weather / soil conditions.
- Change of direction in Singen.
- The capacity on the DB network part is limited or extremely limited.

DE-FR-CH-2 (d1) / DE-FR-2 (d2): Mannheim – Metz – Strasbourg – Basel (d1) / Offenburg (d2)

- Change of direction in Metz to Woippy.
- Profile limitations: Intermodal Gauge C45 (mainly Strasbourg).
- Capacity limitations in Kehl (no change of driver or locomotive).
- Capacity between Metz and Basel is limited. On the same line it is extremely limited between Strasbourg and Mulhouse.

DE-AT-IT-2: Mannheim – Stuttgart – Munich – Verona (Brenner / Salzburg) – Milan Smistamento

- Capacity limitations between Stuttgart – Munich because of many passenger trains.
- Weight limitations at Brenner border.
- Capacity between Brenner and Milano Smistamento is extremely limited.

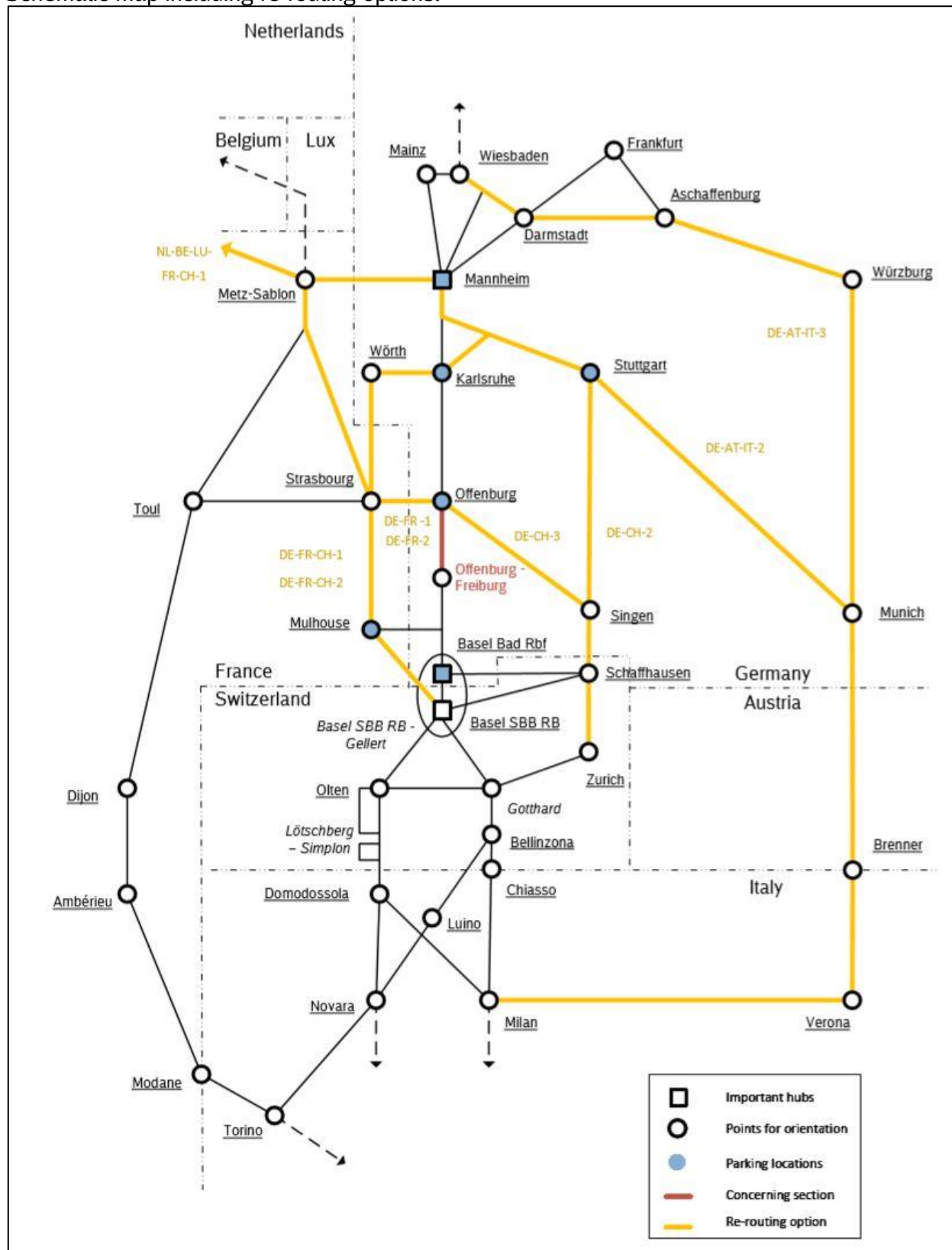
DE-AT-IT-3: Wiesbaden – Frankfurt – Aschaffenburg – Würzburg – Munich – Verona (Brenner / Salzburg) – Milan Smistamento

- Capacity between Brenner and Milano Smistamento is extremely limited.

4.3. Re-routing scenario for section Offenburg – Freiburg

4.3.1. General description

Schematic map including re-routing options.



When this route is blocked the re-routing options are:

Section ID	Usability	Route
NL-BE-LU-FR-CH-1	B	Kijfhoek / Antwerp - Roosendaal/Essen - Luxemburg - FR - Basel
DE-FR-CH-1 (b1) DE-FR -1 (b2)	C	Karlsruhe - Wörth - Strasbourg - Basel (b1) / Offenburg (b2)
DE-CH-2	B	Karlsruhe - Stuttgart - Singen - Zurich
DE-FR-CH-2 (d1) DE-FR-2 (d2)	C	Mannheim - Metz - Strasbourg - Basel (d1) / Offenburg (d2)
DE-AT-IT-2	B	Mannheim - Stuttgart - Munich - Verona (Brenner / Salzburg) - Milan Smistamento
DE-AT-IT-3	tbd	Wiesbaden - Frankfurt - Aschaffenburg - Würzburg - Munich - Verona (Brenner / Salzburg) - Milan Smistamento
DE-CH-3	B	Offenburg - Singen - Zurich

4.3.2. Parameters of re-routing options including capacity indication

IM	Line section	Usage		Traction power	Train length	Line category	Number of tracks	Gradient	Gauge	Intermodal freight code	Signalling	Speed	Length of re-routing option	Weight	Miscellaneous	Capacity indication
		Pass	Frei													
Section: Offenburg - Freiburg																
DB Netz	Offenburg - Freiburg	x	x	AC 15 kV 16,7Hz	690	D4	2	5-10‰	Upon request	P/C 80/410	P2B LZB	160	62	2645-2805		Limited
NL-BE-LU-FR-CH-1: Kijfhoek / Antwerp – Roosendaal/Essen – Luxemburg – FR – Basel																
ProRail	Kijfhoek - Roosendaal border	x	x	1.5 kV DC	740	D4	2	N/A	G2	P/C 80/410	ATB EG	100	42,7	2100-2400		Good, 740 m limited
Infrabel	Antwerp - Essen border	x	x	3kv	740	D4	2	N/A	GB	P/C 70/400	TBL1+	100	23	2200-2470	no dangerous goods allowed in the Kennedy tunnel in Antwerp Re-routing via Antwerp North and Antigoon Tunnel possible	Limited
Infrabel	Antwerp - Ronet - Aubange (border LUX)	x	x	3kv	740	D4	2	N/A	GB	PC 70/400	ETCS L1 FS TBL1+	100	283	N-S: 1200 (Diesel), 1600 (Electric) S-N: 900 (Diesel), 1400 (Electric)	Between Antwerpen Luchtbal and Lier = comprehensive network no dangerous goods allowed in the Kennedy tunnel in Antwerp Re-routing via Antwerp North and Antigoon Tunnel possible	Limited
CFL	Rodange - Esch-sur-Alsette - Bettembourg		x	25 kV	750	D4	2	≤ 19‰	GB - C50	Upon request	ETCS Level 1	90		D4		Limited
SNCF Réseau	LUX border - Metz-Sablon - Strasbourg - Mulhouse - Saint Louis border	x	x	25kv AC	750	D4	2	< 12,5‰	GB1	C45	KVB	121-160 km/h		D4		limited - extremely limited
SBB	Saint Louis border – Basel RB Muttentz	x	x	25kV / 15 kV AC	750	D4	2	7‰	EBV 1	EBV 1 / C25/344, C45 / 353, B45 / 353	KVB L1LS - 3.4.0	100	9	2000	several intermodal freight codes possible due to the annual AS-eeee-0945	Limited
DE-FR-CH-1 (b1) / DE-FR -1 (b2): Karlsruhe - Wörth - Strasbourg – Basel (b1) / Offenburg (b2)																
DB Netz	(Karlsruhe Gbf -) Mannheim - Wörth	x	x	AC 15 kV 16,7Hz	600	D4	2	N/A	GA	P/C 80/410	P2B	120	122	3030-3945 (V-Tfz DB 232/233)	Karlsruhe <-> France, change of direction in Wörth	Extremely limited
DB Netz	Wörth - Lauterbourg (border)	x	x	Diesel	600	D4	1	N/A	Upon request	P/C 80/410	P2B	100	11	3030-3945 (V-Tfz DB 232/233)	Karlsruhe <-> France, change of direction in Wörth	Extremely limited
SNCF Réseau	Lauterbourg border - Strasbourg	x	x	Diesel	750	D4	2	< 12,5‰	GB1	C45	No speed control system	61-100 km/h	58	D4	Karlsruhe - Basel: change of direction in Hausbergen Night closure between 21.00 and 06:00 hours Limited capacity in Lauterbourg between 06:00 -21.00 hours	Good
SNCF Réseau	Strasbourg - Mulhouse	x	x	25kv AC	750	D4	2	< 12,5‰	GB1	C45	KVB	161-220km/h	107	D4		Extremely limited
SNCF Réseau	Mulhouse - Saint Louis (border)	x	x	25kv AC	750	D4	2	< 12,5‰	GB	C45	KVB	121-160 km/h	28	D4		Limited
SBB	Saint Louis border – Basel RB Muttentz	x	x	25kV / 15 kV AC	750	D4	2	7‰	EBV 1	EBV 1 / C25/344, C45 / 353, B45 / 353	KVB L1LS - 3.4.0	100	9	2000	several intermodal freight codes possible due to the annual AS-eeee-	Limited
SNCF Réseau	Lauterbourg border - Strasbourg	x	x	Diesel	750	D4	2	< 12,5‰	GB1	C45	No speed control system	61-100 km/h	58	D4	Karlsruhe - Basel: change of direction in Hausbergen	Good
DB Netz	Kehl - Appenweiler (Offenburg)	x	x	AC 15 kV 16,7Hz	740	D4	2	N/A	Upon request	P/C 80/410	P2B	160	14			Good
DE-CH-2: Mannheim - Stuttgart - Singen - Zurich																
DB Netz	(Mannheim -) Kornwestheim- Singen	x	x	AC 15 kV 16,7Hz	580	D4	1	< 20‰	Upon request	P/C 65/395	P2B	100	276	1245-1640	Change of direction in Singen; partly single track	Limited Extremely limited
DB Netz	Singen – Schaffhausen (border)	x	x	AC 15 kV 16,7Hz	580	D4	2	N/A	Upon request	P/C 70/400	P2B	160	20	1: 3130t 2: 2275t		Limited
SBB	Schaffhausen (border) - Zurich Oerlikon	x	x	AC 15 kV 16,7Hz	750	D4	2	10‰	EBV 2, includes UIC G1	P/C 60/384	L1 LS 3.4.0	100	52	22,5 t	Some part one track only	Good

IM	Line section	Usage		Traction power	Train length	Line category	Number of tracks	Gradient	Gauge	Intermodal freight code	Signalling	Speed	Length of re-routing option	Weight	Miscellaneous	Capacity indication
		Pass	Frei													
DE-FR-CH-2 (d1) / DE-FR-2 (d2): Mannheim – Metz – Strasbourg – Basel (d1) / Offenburg (d2)																
DB Netz	Mannheim - Kaiserslautern - Saarbrücken - Forbach border	x	x	AC 15 kV 16,7 Hz	740	D4	2 to 4	< 20‰	GA	P/C 70/400	P2B	Up to 160	135	1890-1935		Good
SNCF Réseau	Forbach (border) - Metz	x	x	25kv AC	750	D4	2	< 12,5‰	GB1	C45	KVB	121-160 km/h	75	D4		Good
SNCF Réseau	Metz - Réding	x	x	25kv AC	750	D4	2	< 12,5‰	GB1	C45	KVB	121-160 km/h	86	D4		Limited
SNCF Réseau	Réding - Strasbourg	x	x	25kv AC	750	D4	2	< 12,5‰	GB	C45	KVB	121-160 km/h	68	D4		Limited
SNCF Réseau	Strasbourg - Mulhouse	x	x	25kv AC	750	D4	2	< 12,5‰	GB1	C45	KVB	161-220km/h	107	D4		Extremely limited
SNCF Réseau	Mulhouse - Saint Louis (border)	x	x	25kv AC	750	D4	2	< 12,5‰	GB	C45	KVB	121-160 km/h	28	D4		Limited
SBB	Saint Louis border – Basel RB Muttentz	x	x	25kV / 15 kV AC	750	D4	2	7‰	EBV 1	EBV 1 / C25/344, C45 / 353, B45 / 353	KVB L1LS - 3.4.0	100	9	2000	several intermodal freight codes possible due to the annual AS-eeee-0945	Limited
SNCF Réseau	Strasbourg-Offenburg	x	x	25kv AC	750	D4	2	< 12,5‰	GB1	C45	No speed control system	101-120km/h	5	D4		Excellent
DB Netz	Kehl - Appenweiler (Offenburg)	x	x	AC 15 kV 16,7Hz	740	D4	2	N/A	Upon request	P/C 80/410	P2B	160	14			Good
DE-AT-IT-2: Mannheim - Stuttgart - Munich - Verona (Brenner/Salzburg) – Milan SM																
DB Netz	(Mannheim - Mülacker - Ludwigsburg - Kornwestheim - Ulm - Augsburg Hbf -) München - Rosenheim - Kufstein	x	x	AC 15 kV 16,7Hz	600 Standard Train (DB Loco 185)	D4	2	≤ 15‰	Upon request	P/C 80/410	P2B	160	460	With Loco DB 185: Ma-Ku: 2.700 Ku-Ma: 2.530		Good
ÖBB	Kufstein - Wörgl - Hall i. T. - Innsbruck - Brenner	x	x	15 kV 16,7 Hz	600 RFC 3: 600-649	22,5t (8,0t/m) RFC 3: D4	2	0‰-30‰	GA, G1 und G2 RFC 3: GB&G2	P/C 80/410	P2B, ETCS 2 RFC 3: P2B	130 RFC 3: 80-130		700 t (one loco 1216)	Contact ÖBB	
RFI	Brenner – Verona – Milano SM	x	x	3 kV	600	D4L	2	20‰-25‰ for , Brennero - Bivio/P.C. S. Massimo 5‰-10‰ for Verona RFC 6: 6-10‰ for Verona-Milano	upon request	P/C 80/410	BACC/SCMT	100	371	1600 2500 under specific conditions for incoming trains		Extremely limited
DE-AT-IT-3: Wiesbaden - Frankfurt - Aschaffenburg – Würzburg – Munich – Verona (Brenner / Salzburg) – Milan Smistamento																
DB Netz	Aschaffenburg - Gemünden - Würzburg - Ansbach - Donauwörth - Augsburg - Munich - Kufstein	x	x	AC 15 kV 16,7Hz	640	D4	2	≤ 20‰	Upon request	P/C 80 P/C 410	P2B	Up to 160		N-S: 1600t S-N: 1910t	further possible freight paths between Aschaffenburg and Munich	Good
ÖBB	Kufstein - Wörgl - Hall i. T. - Innsbruck - Brenner	x	x	15 kV 16,7 Hz	600 RFC 3: 600-649	22,5t (8,0t/m) RFC 3: D4	2	0‰-30‰	GA, G1 und G2 RFC 3: GB&G2	P/C 80/410	P2B, ETCS 2 RFC 3: P2B	130 RFC 3: 80-130		700 t (one loco 1216)	Contact ÖBB	
RFI	Brenner – Verona – Milano SM	x	x	3 kV	600	D4L	2	20‰-25‰ for , Brennero - Bivio/P.C. S. Massimo 5‰-10‰ for Verona	upon request	P/C 80/410	BACC/SCMT	100	371	1600 2500 under specific conditions for incoming trains		Extremely limited
DE-CH-3: Offenburg - Singen - Zurich																
DB Netz	Offenburg - Singen	x	x	AC 15 kV 16,7Hz	580	D4	2	< 40‰	Upon request	P/C 45/375	P2B	Up to 160	150	1060-1230		Limited
DB Netz	Singen - Schaffhausen	x	x	AC 15 kV 16,7Hz	580	D4	2	N/A	Upon request	P/C 70/400	P2B	160	20	1: 3130t 2: 2275t		Limited
SBB	Schaffhausen (border) - Zurich Oerlikon	x	x	AC 15 kV 16,7Hz	750	D4	2	10‰	EBV 2, includes UIC G1	P/C 60/384	L1 LS 3.4.0	100	52	22,5 t	Some part one track only	Good

4.3.3. Parking locations & capacity

Country	Location	Number of tracks	Maximum train length	Restrictions
Germany	Area Mannheim	6-7	max. 700 meters	
Germany	Karlsruhe	1-2	max. 700 meters	
Germany	Stuttgart	4	max. 700 meters	
Germany	Offenburg	2	ca. 700 meters	
Germany	Basel Bad. Bf	5	max. 650 meters	capacity very limited
France	Mulhouse	5	max. 750 meters	
France	Metz	>3	max. 700 meters	Metz Sablon
France	Strasbourg	>3	max. 750 meters	Hausbergen (railway modernization)
Switzerland ³	Basel SBB RB	4	max. 650 meters	

Information on additional parking locations in The Netherlands, Belgium and France is given in the northern part scenarios in chapter 2.

4.3.4. Restrictions

Each re-routing option can have specific restrictions which are commented here.

NL-BE-LU-FR-CH-1: Kijfhoek / Antwerp - Roosendaal/Essen - Luxemburg - FR - Basel

- Weight restriction (Belgium): CI66 900t Traxx 1400t.
- No dangerous goods allowed in the Kennedy tunnel in Antwerp. Freight trains with dangerous goods will have a deviation route via Antwerp North and the Antigoon tunnel (Liefkenshoek Rail link). Extra travel time is 15 minutes
- Profile limitations (France): Intermodal Gauge C45.
- The whole line despite the ProRail part is limited in capacity. Extreme limitations on the SNCF part.

DE-FR-CH-1 (b1) / DE-FR-1 (b2): Karlsruhe - Wörth - Strasbourg - Basel (b1) / Offenburg (b2)

- Track between Wörth and Strasbourg / Hausbergen is not electrified, diesel locomotives are required.
- Single track between Wörth - Lauterbourg: No turnouts on single track line.
- Change of direction in Wörth.
- Night closure of track between 21.00 hours and 6.00 hours.
- Capacity limitations in Wörth (track length and occupancy).
- Limited capacity in Lauterbourg between 6.00 - 21.00 hours due to at grade platform access. Between Lauterbourg and Wörth capacity is extremely limited.
- Profile limitations: Intermodal Gauge C45 (mainly Strasbourg).

³ In case of an incident in Switzerland trains running north must park at terminals / tracks in Italy. Parking locations in Switzerland itself are very limited.

- Change of direction in Hausbergen.
- Capacity limitations between 6.00 – 21.00 hours because of Strasbourg passenger station.
- Extremely limited capacity between Strasbourg and Mulhouse.
- Capacity limitations in Kehl (no change of driver or locomotive).

DE-CH-2: Mannheim – Stuttgart – Singen – Zurich

- Partly single track between Stuttgart – Singen and Singen – Zurich.
- Train weight limitations because of gradient and weather / soil conditions.
- Change of direction in Singen.
- Capacity is limited on the DB Netz part of the line.

DE-FR-CH-2 (d1) / DE-FR-2 (d2): Mannheim – Metz – Strasbourg – Basel (d1) / Offenburg (d2)

- Change of direction in Metz to Woippy.
- Profile limitations: Intermodal Gauge C45 (mainly Strasbourg).
- Change of direction in Hausbergen.
- Capacity limitations between 6.00 – 21.00 hours because of Strasbourg passenger station.
- Capacity limitations in Kehl (no change of driver or locomotive).
- The capacity on the SNCF network between Metz and Basel RB Muttentz is limited and extremely limited between Strasbourg and Mulhouse.

DE-AT-IT-2: Mannheim – Stuttgart – Munich – Verona (Brenner / Salzburg) – Milan Smistamento

- Capacity limitations between Stuttgart – München because of many passenger trains.
- Weight limitations at Brenner border.
- Between Brenner and Milano Smistamento capacity is extremely limited.

DE-AT-IT-3: Wiesbaden – Frankfurt – Aschaffenburg – Würzburg – Munich – Verona (Brenner / Salzburg) – Milan Smistamento

- Capacity between Brenner and Milano Smistamento is extremely limited.

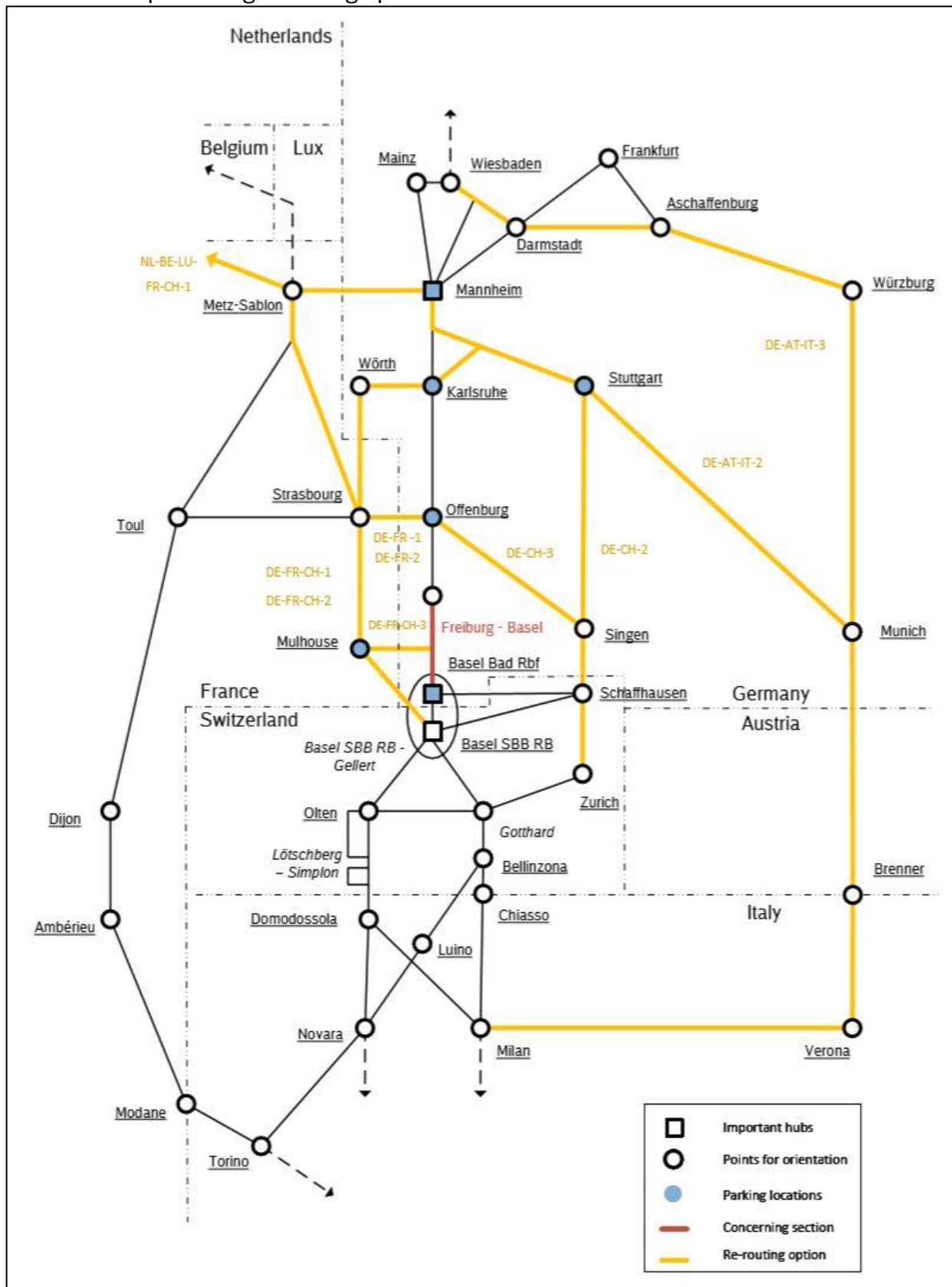
DE-CH-3: Offenburg – Singen – Zurich

- Train weight restrictions (mountainous region): maximum 1060-1230t.
- Profile restrictions P/C 375 (P/C 45).
- On the DB part capacity is limited.

4.4. Re-routing scenario for section Freiburg – Basel SBB RB

4.4.1. General description

Schematic map including re-routing options.



When this route is blocked the re-routing options are:

Section ID	Usability	Route
NL-BE-LU-FR-CH-1	B	Kijfhoek / Antwerp - Roosendaal/Essen - Luxemburg - FR - Basel
DE-FR-CH-1 (b1) DE-FR -1 (b2)	C	Karlsruhe - Wörth - Strasbourg - Basel (b1) / Offenburg (b2)
DE-CH-2	B	Karlsruhe - Stuttgart - Singen - Zurich
DE-FR-CH-2 (d1) DE-FR-2 (d2)	C	Mannheim - Metz - Strasbourg - Basel (d1) / Offenburg (d2)
DE-AT-IT-2	B	Mannheim - Stuttgart - Munich - Verona (Brenner / Salzburg) - Milan Smistamento
DE-AT-IT-3	tbd	Wiesbaden - Frankfurt - Aschaffenburg - Würzburg - Munich - Verona (Brenner / Salzburg) - Milan Smistamento
DE-FR-CH-3	B	Müllheim - Mulhouse - Basel (if incident between Müllheim and Basel)
DE-CH-3	B	Offenburg - Singen - Zurich

4.4.2. Parameters of re-routing options including capacity indication

IM	Line section	Usage		Traction power	Train length	Line category	Number of tracks	Gradient	Gauge	Intermodal freight code	Signalling	Speed	Length of re-routing option	Weight	Miscellaneous	Capacity Indication
		Pass	Frei													
Section: Freiburg - Basel (Muttentz)																
DB Netz	Freiburg - Basel (border)	x	x	AC 15 kV 16,7Hz	from local border	D4	2	5-10‰	Upon request	P/C 70/400	PZBLZB	160	65	2645-2805		Limited
SBB	Basel (border) – Basel SBB RB	x	x	AC 15 kV 16,7 Hz	750	D4	2	10‰	EBV 03 includes UIC G1	P/C 80/405	L1LS – 3.4.0		5	22,5 t		Good
NL-BE-LU-FR-CH-1: Kijfhoek / Antwerp – Roosendaal/Essen – Luxemburg – FR – Basel																
ProRail	Kijfhoek - Roosendaal border	x	x	1.5 kV DC	740	D4	2	N/A	G2	P/C 80/410	ATB EG	100	42,7	2100-2400		Good, 740 m limited
Infrabel	Antwerp - Essen border	x	x	3kv	740	D4	2	N/A	GB	P/C 70/400	TBL1+	100	23	2200-2470	no dangerous goods allowed in the Kennedy tunnel in Antwerp Re-routing via Antwerp North and Antigoon Tunnel possible	Limited
Infrabel	Antwerp - Ronet - Aubange (border LUX)	x	x	3kv	740	D4	2	N/A	GB	PC 70/400	ETCS L1 FS TBL1+	100	283	N-S: 1200 (Diesel), 1600 (Electric) S-N: 900 (Diesel), 1400 (Electric)	Between Antwerpen Luchtbal and Lier = comprehensive network no dangerous goods allowed in the Kennedy tunnel in Antwerp Re-routing via Antwerp North and Antigoon Tunnel possible	Limited
CFL	Rodange - Esch-sur-Alsette - Bettembourg		x	25 kV	750	D4	2	≤ 19‰	GB - C50	Upon request	ETCS Level 1	90		D4		Limited
SNCF Réseau	LUX border - Metz-Sablon - Strasbourg - Mulhouse - Saint Louis border	x	x	25kv AC	750	D4	2	< 12,5‰	GB1	C45	KVB	121-160 km/h		D4		limited - extremely limited
SBB	Saint Louis border – Basel RB Muttentz	x	x	25kV / 15 kV AC	750	D4	2	7‰	EBV 1	EBV 1 / C25/344, C45 / 353, B45 / 353	KVB L1LS - 3.4.0	100	9	2000	several intermodal freight codes possible due to the annual AS-eeee-0945	Limited
DE-FR-CH-1 (b1) / DE-FR -1 (b2): Karlsruhe - Wörth - Strasbourg – Basel (b1) / Offenburg (b2)																
DB Netz	(Karlsruhe Gbf -) Mannheim - Wörth	x	x	AC 15 kV 16,7Hz	600	D4	2	N/A	GA	P/C 80/410	PZB	120	122	3030-3945 (V-Tfz DB 232/233)	Karlsruhe <-> France, change of direction in Wörth	Extremely limited
DB Netz	Wörth - Lauterbourg (border)	x	x	Diesel	600	D4	1	N/A	Upon request	P/C 80/410	PZB	100	11	3030-3945 (V-Tfz DB 232/233)	Karlsruhe <-> France, change of direction in Wörth	Extremely limited
SNCF Réseau	Lauterbourg border - Strasbourg	x	x	Diesel	750	D4	2	< 12,5‰	GB1	C45	No speed control system	61-100 km/h	58	D4	Karlsruhe - Basel: change of direction in Hausbergen Night closure between 21:00 and 06:00 hours Limited capacity in Lauterbourg between 06:00 -21:00 hours	Good
SNCF Réseau	Strasbourg - Mulhouse	x	x	25kv AC	750	D4	2	< 12,5‰	GB1	C45	KVB	161-220km/h	107	D4		Extremely limited
SNCF Réseau	Mulhouse - Saint Louis (border)	x	x	25kv AC	750	D4	2	< 12,5‰	GB	C45	KVB	121-160 km/h	28	D4		Limited
SBB	Saint Louis border – Basel RB Muttentz	x	x	25kV / 15 kV AC	750	D4	2	7‰	EBV 1	EBV 1 / C25/344, C45 / 353, B45 / 353	KVB L1LS - 3.4.0	100	9	2000	several intermodal freight codes possible due to the annual AS-eeee-0945	Limited
SNCF Réseau	Lauterbourg border - Strasbourg	x	x	Diesel	750	D4	2	< 12,5‰	GB1	C45	No speed control system	61-100 km/h	58	D4	Karlsruhe - Basel: change of direction in Hausbergen Night closure between 21:00 and 06:00 hours Limited capacity in Lauterbourg between 06:00 -21:00 hours	Good
DB Netz	Kehl - Appenweiler (Offenburg)	x	x	AC 15 kV 16,7Hz	740	D4	2	N/A	Upon request	P/C 80/410	PZB	160	14			Good
DE-CH-2: Mannheim - Stuttgart - Singen - Zurich																
DB Netz	(Mannheim -) Kornwestheim- Singen	x	x	AC 15 kV 16,7Hz	580	D4	1	< 20‰	Upon request	P/C 65/395	PZB	100	276	1245-1640	Change of direction in Singen; partly single track	Limited Extremely limited
DB Netz	Singen – Schaffhausen (border)	x	x	AC 15 kV 16,7Hz	580	D4	2	N/A	Upon request	P/C 70/400	PZB	160	20	1: 3130t 2: 2275t		Limited
SBB	Schaffhausen (border) - Zurich Oerlikon	x	x	AC 15 kV 16,7Hz	750	D4	2	10‰	EBV 2, includes UIC G1	P/C 60/384	L1 LS 3.4.0	100	52	22,5 t	Some part one track only	Good

IM	Line section	Usage		Traction power	Train length	Line category	Number of tracks	Gradient	Gauge	Intermodal freight code	Signalling	Speed	Length of re-routing option	Weight	Miscellaneous	Capacity Indication
		Pass	Frei													
DE-FR-CH-2 (d1) / DE-FR-2 (d2): Mannheim – Metz – Strasbourg – Basel (d1) / Offenburg (d2)																
DB Netz	Mannheim - Kaiserslautern - Saarbrücken - Forbach border	x	x	AC 15 kV 16,7 Hz	740	D4	2 to 4	< 20‰	GA	P/C 70/400	PZB	Up to 160	135	1890-1935		Good
SNCF Réseau	Forbach (border) - Metz	x	x	25kv AC	750	D4	2	< 12,5‰	GB1	C45	KVB	121-160 km/h	75	D4		Good
SNCF Réseau	Metz - Réding	x	x	25kv AC	750	D4	2	< 12,5‰	GB1	C45	KVB	121-160 km/h	86	D4		Limited
SNCF Réseau	Réding - Strasbourg	x	x	25kv AC	750	D4	2	< 12,5‰	GB	C45	KVB	121-160 km/h	68	D4		Limited
SNCF Réseau	Strasbourg - Mulhouse	x	x	25kv AC	750	D4	2	< 12,5‰	GB1	C45	KVB	161-220km/h	107	D4		Extremely limited
SNCF Réseau	Mulhouse - Saint Louis (border)	x	x	25kv AC	750	D4	2	< 12,5‰	GB	C45	KVB	121-160 km/h	28	D4		Limited
SBB	Saint Louis border – Basel RB Muttentz	x	x	25kV / 15 kV AC	750	D4	2	7‰	EBV 1	EBV 1 / C25/344, C45 / 353, B45 / 353	KVB L1LS - 3.4.0	100	9	2000	several intermodal freight codes possible due to the annual AS-	Limited
SNCF Réseau	Strasbourg-Offenburg	x	x	25kv AC	750	D4	2	< 12,5‰	GB1	C45	No speed control system	101-120km/h	5	D4		Excellent
DB Netz	Kehl - Appenweiler (Offenburg)	x	x	AC 15 kV 16,7Hz	740	D4	2	N/A	Upon request	P/C 80/410	PZB	160	14			Good
DE-AT-IT-2: Mannheim - Stuttgart - Munich - Verona (Brenner/Salzburg) – Milan Sm																
DB Netz	(Mannheim - Mühlacker - Ludwigsburg - Kornwestheim - Ulm - Augsburg Hbf -) München - Rosenheim - Kufstein	x	x	AC 15 kV 16,7Hz	600 Standard Train (DB Loco 185)	D4	2	≤ 15‰	Upon request	P/C 80/410	PZB	160	460	With Loco DB 185: Ma-Ku: 2.700 Ku-Ma: 2.530		Good
ÖBB	Kufstein - Wörgl - Hall i. T. - Innsbruck - Brenner	x	x	15 kV 16,7 Hz	600 RFC 3: 600-649	22,5t (8,0t/m) RFC 3: D4	2	0‰-30‰	GA, G1 und G2 RFC 3: GB&G2	P/C 80/410	PZB, ETCS 2 RFC 3: PZB	130 RFC 3: 80-130		700 t (one loco 1216)	Contact ÖBB	
RFI	Brenner – Verona – Milano SM	x	x	3 kV	600	D4L	2	20‰-25‰ for , Brennero - Bivio/P.C. S. Massimo 5‰-10‰ for Verona RFC 6: 6-10‰ for Verona- Milano	upon request	P/C 80/410	BACC/SCMT	100	371	1600 2500 under specific conditions for incoming trains		Extremely limited
DE-AT-IT-3: Wiesbaden - Frankfurt - Aschaffenburg – Würzburg – Munich – Verona (Brenner / Salzburg) – Milan Smistamento																
DB Netz	Aschaffenburg - Gemünden - Würzburg - Ansbach - Donauwörth - Augsburg - Munich - Kufstein	x	x	AC 15 kV 16,7Hz	640	D4	2	≤ 20‰	Upon request	P/C 80 P/C 410	PZB	Up to 160		N-S: 1600t S-N: 1910t	further possible freight paths between Aschaffenburg and Munich	Good
ÖBB	Kufstein - Wörgl - Hall i. T. - Innsbruck - Brenner	x	x	15 kV 16,7 Hz	600 RFC 3: 600-649	22,5t (8,0t/m) RFC 3: D4	2	0‰-30‰	GA, G1 und G2 RFC 3: GB&G2	P/C 80/410	PZB, ETCS 2 RFC 3: PZB	130 RFC 3: 80-130		700 t (one loco 1216)	Contact ÖBB	
RFI	Brenner – Verona – Milano SM	x	x	3 kV	600	D4L	2	20‰-25‰ for , Brennero - Bivio/P.C. S. Massimo 5‰-10‰ for Verona RFC 6: 6-10‰ for Verona- Milano	upon request	P/C 80/410	BACC/SCMT	100	371	1600 2500 under specific conditions for incoming trains		Extremely limited
DE-CH-3: Offenburg - Singen - Zurich																
DB Netz	Offenburg - Singen	x	x	AC 15 kV 16,7Hz	580	D4	2	< 40‰	Upon request	P/C 45/375	PZB	Up to 160	150	1060-1230		Limited
DB Netz	Singen - Schaffhausen	x	x	AC 15 kV 16,7Hz	580	D4	2	N/A	Upon request	P/C 70/400	PZB	160	20	1: 3130t 2: 2275t		Limited
SBB	Schaffhausen (border) - Zurich Oerlikon	x	x	AC 15 kV 16,7Hz	750	D4	2	10‰	EBV 2, includes UIC G1	P/C 60/384	L1 LS 3.4.0	100	52	22,5 t	Some part one track only	Good
DE-FR-CH-3: Müllheim - Mulhouse - Basel																
DB Netz	Müllheim - Neuenburg (Rhine bridge)	x	x	AC 15 kV 16,7Hz	446m by traincrossing, 740m by free passage	D4	1	N/A	GA	P/C 80/410	PZB	Up to 100	5	3190-3965	France - Basel is only possible with direction change north of Müllheim	Limited
SNCF Réseau	Neuenburg - Mulhouse	x	x	25kv AC	750	D4	1	< 12,5‰	GB1	C45	KVB	61-100 km/h	19	D4		Excellent
SNCF Réseau	Mulhouse - Saint Louis (border)	x	x	25kv AC	750	D4	2	< 12,5‰	GB	C45	KVB	121-160 km/h	28	D4		Limited
SBB	Saint Louis border – Basel RB Muttentz	x	x	25kV / 15 kV AC	750	D4	2	7‰	EBV 1	EBV 1 / C25/344, C45 / 353, B45 / 353	KVB L1LS - 3.4.0	100	9	2000	several intermodal freight codes possible due to the annual AS-eeee-0945	Limited

4.4.3. Parking locations & capacity

Country	Location	Number of tracks	Maximum train length	Restrictions
Germany	Area Mannheim	6-7	max. 700 meters	
Germany	Karlsruhe	1-2	max. 700 meters	
Germany	Stuttgart	4	max. 700 meters	
Germany	Offenburg	2	ca. 700 meters	
Germany	Basel Bad. Bf	5	max. 650 meters	capacity very limited
France	Mulhouse	5	max. 750 meters	
France	Metz	>3	max. 700 meters	Metz Sablon
France	Strasbourg	>3	max. 750 meters	Hausbergen (railway modernization)
Switzerland ⁴	Basel SBB RB	4	max. 650 meters	

Information on additional parking locations in The Netherlands, Belgium and France is given in the northern part scenarios in chapter 2.

4.4.4. Restrictions

Each re-routing option can have specific restrictions which are commented here.

NL-BE-LU-FR-CH-1: Kijfhoek / Antwerp - Roosendaal/Essen - Luxemburg - FR - Basel

- Weight restriction (Belgium): Cl66 900t Traxx 1400t.
- No dangerous goods allowed in the Kennedy tunnel in Antwerp. Freight trains with dangerous goods will have a deviation route via Antwerp North and the Antigoon tunnel (Liefkenshoek Rail link). Extra travel time is 15 minutes.
- Profile limitations (France): Intermodal Gauge C45.
- The whole line despite the ProRail part is limited in capacity. Extreme limitations on the SNCF part.

DE-FR-CH-1 (b1) / DE-FR-1 (b2): Karlsruhe - Wörth - Strasbourg - Basel (b1) / Offenburg (b2)

- Track between Wörth and Strasbourg / Hausbergen is not electrified, diesel locomotives are required.
- Single track between Wörth - Lauterbourg: No turnouts on single track line.
- Change of direction in Wörth.
- Night closure of track between 21.00 hours and 6.00 hours.
- Capacity limitations in Wörth (track length and occupancy).
- Limited capacity in Lauterbourg between 6.00 - 21.00 hours due to at grade platform access. Between Lauterbourg and Wörth capacity is extremely limited.
- Profile limitations: Intermodal Gauge C45 (mainly Strasbourg).

⁴ In case of an incident in Switzerland trains running north must park at terminals / tracks in Italy. Parking locations in Switzerland itself are very limited.

- Change of direction in Hausbergen.
- Capacity limitations between 6.00 – 21.00 hours because of Strasbourg passenger station.
- Capacity extremely limited between Strasbourg and Mulhouse.
- Capacity limitations in Kehl (no change of driver or locomotive).

DE-CH-2: Mannheim – Stuttgart – Singen – Zurich

- Partly single track between Stuttgart – Singen and Singen – Zurich.
- Train weight limitations because of gradient and weather / soil conditions.
- Change of direction in Singen.
- Limited capacity between Mannheim and Schaffhausen border.

DE-FR-CH-2 (d1) / DE-FR-2 (d2): Mannheim – Metz – Strasbourg – Basel (d1) / Offenburg (d2)

- Change of direction in Metz to Woippy.
- Profile limitations: Intermodal Gauge C45 (mainly Strasbourg).
- Change of direction in Hausbergen.
- Capacity limitations between 6.00 – 21.00 hours due to Strasbourg passenger station.
- Capacity limitations in Kehl (no change of driver or locomotive).
- Limited capacity between Metz and Basel RB Muttentz. Extremely limited capacity between Strasbourg and Mulhouse.

DE-AT-IT-2: Mannheim – Stuttgart – Munich – Verona (Brenner / Salzburg) – Milan Smistamento

- Train weight limitations near Stuttgart – Ulm .
- Capacity limitations between Stuttgart – Munich because of many passenger trains.
- Weight limitations at Brenner border.
- Capacity extremely limited between Brenner and Milano Smistamento.

DE-CH-3: Offenburg – Singen – Zurich

- Train weight restrictions (mountainous region): maximum 1060 - 1230t.
- Profile restrictions P/C 45/375.
- Limited capacity on the German part of the line.

DE-AT-IT-3: Wiesbaden – Frankfurt – Aschaffenburg – Würzburg – Munich – Verona (Brenner / Salzburg) – Milan Smistamento

- Capacity is extremely limited between Brenner and Milano Smistamento.

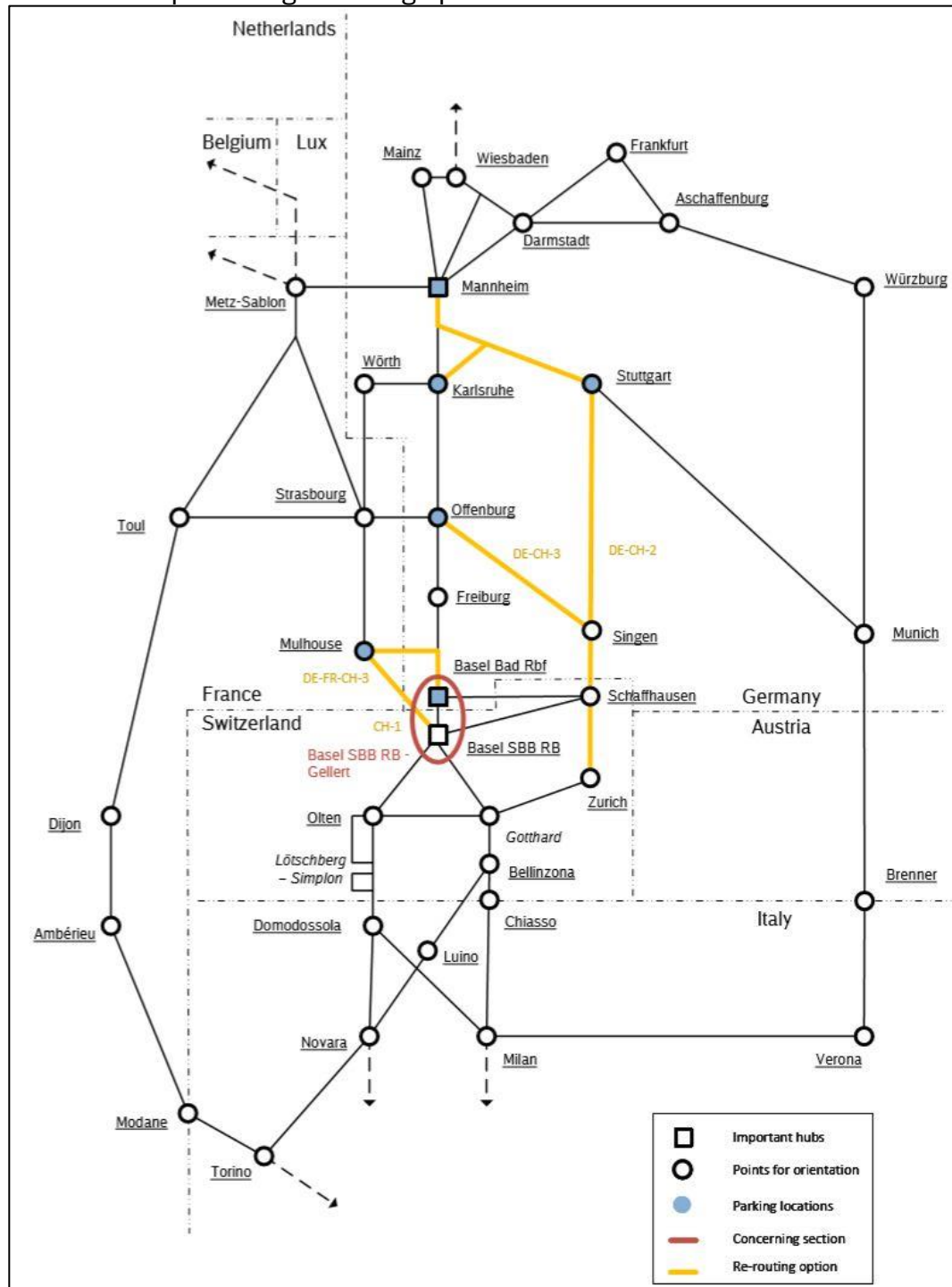
DE-FR-CH-3: Müllheim - Mulhouse -Basel

- Capacity is limited on the German part of the line.
- Direction France – Basel is only possible with a direction change north of Müllheim.
- From Mulhouse to Basel RB Muttenez capacity is limited.

4.5. Re-routing scenario for section Basel SBB RB – Gellert (Rhine bridge)

4.5.1. General description

Schematic map including re-routing options.



When this route is blocked the re-routing options are:

Section ID	Usability	Route
DE-CH-2	B	Karlsruhe - Stuttgart - Singen - Zurich
DE-CH-3	B	Offenburg - Singen - Zurich
DE-FR-CH-3	B	Müllheim - Mulhouse - Basel
CH-1	B	Via Basel SBB passenger station (change direction)

4.5.2. Parameters of re-routing options including capacity indication

IM	Line section	Usage		Traction power	Train length	Line category	Number of tracks	Gradient	Gauge	Intermodal freight code	Signalling	Speed	Length of re-routing option	Weight	Miscellaneous	Capacity Indication
		Pass	Frei													
Section: Basel SBB RB – Gellert (Rhine bridge)																
SBB	Basel SBB RB - Gellert (Rhine bridge)	x	x	AC 15 kV 16,7Hz	750	D4	2	11‰	EBV 3, includes UIC G1	P/C 80/405	L1 LS 3.4.0		5	22,5 t		Limited
DE-CH-2: Mannheim - Stuttgart - Singen - Zurich																
DB Netz	(Mannheim -) Kornwestheim- Singen	x	x	AC 15 kV 16,7Hz	580	D4	1	<20‰	Upon request	P/C 65/395	P2B	100	276	1245-1640	Change of direction in Singen; partly single track	Limited Extremely limited
DB Netz	Singen – Schaffhausen (border)	x	x	AC 15 kV 16,7Hz	580	D4	2	N/A	Upon request	P/C 70/400	P2B	160	20	1: 3130t 2: 2275t		Limited
SBB	Schaffhausen (border) - Zurich Oerlikon	x	x	AC 15 kV 16,7Hz	750	D4	2	10‰	EBV 2, includes UIC G1	P/C 60/384	L1 LS 3.4.0	100	52	22,5 t	Some part one track only	Good
DE-CH-3: Offenburg - Singen - Zurich																
DB Netz	Offenburg - Singen	x	x	AC 15 kV 16,7Hz	580	D4	2	<40‰	Upon request	P/C 45/375	P2B	Up to 160	150	1060-1230		Limited
DB Netz	Singen - Schaffhausen	x	x	AC 15 kV 16,7Hz	580	D4	2	N/A	Upon request	P/C 70/400	P2B	160	20	1: 3130t 2: 2275t		Limited
SBB	Schaffhausen (border) - Zurich Oerlikon	x	x	AC 15 kV 16,7Hz	750	D4	2	10‰	EBV 2, includes UIC G1	P/C 60/384	L1 LS 3.4.0	100	52	22,5 t	Some part one track only	Good
DE-FR-CH-3: Müllheim - Mulhouse -Basel																
DB Netz	Müllheim - Neuenburg (Rhine bridge)	x	x	AC 15 kV 16,7Hz	446m by traincrossing, 740m by free passage	D4	1	N/A	GA	P/C 80/410	P2B	Up to 100	5	3190-3965	France - Basel is only possible with direction change north of Müllheim	Limited
SNCF Réseau	Neuenburg - Mulhouse	x	x	25kv AC	750	D4	1	< 12,5‰	GB1	C45	KVB	61-100 km/h	19	D4		Excellent
SNCF Réseau	Mulhouse - Saint Louis (border)	x	x	25kv AC	750	D4	2	< 12,5‰	GB	C45	KVB	121-160 km/h	28	D4		Limited
SBB	Saint Louis border – Basel RB Muttentz	x	x	25kV / 15 kV AC	750	D4	2	7‰	EBV 1	EBV 1 / C25/344, C45 / 353, B45 / 353	KVB L1LS - 3.4.0	100	9	2000	several intermodal freight codes possible due to the annual AS-eeee-0945	Limited
CH-1: Via Basel SBB passenger station (change direction)																
SBB	Basel SBB passenger station	x	x	AC 15 kV 16,7 Hz	600	D4	2	11‰	EBV 3, includes UIC G1	P/C 80/405	L1 LS 3.4.0		5	22,5 t	change of direction and locomotive necessary	Extremely limited

4.5.3. Parking locations & capacity

Country	Location	Number of tracks	Maximum train length	Restrictions
Germany	Area Mannheim	6-7	max. 700 meters	
Germany	Karlsruhe	1-2	max. 700 meters	
Germany	Stuttgart	4	max. 700 meters	
Germany	Offenburg	2	ca. 700 meters	
Germany	Basel Bad. Bf	5	max. 650 meters	capacity very limited
France	Mulhouse	5	max. 750 meters	
Switzerland ⁵	Basel SBB RB	4	max. 650 meters	

4.5.4. Restrictions

Each re-routing option can have specific restrictions which are commented here.

DE-CH-2: Karlsruhe – Stuttgart – Singen – Zurich

- Partly single track between Stuttgart – Singen and Singen – Zurich.
- Train weight limitations because of gradient and weather / soil conditions.
- Change of direction in Singen.
- Capacity is limited on the German part of the line.

DE-CH-3: Offenburg – Singen – Zurich

- Train weight restrictions (mountainous region): maximum 1060-1230t.
- Profile restrictions P/C 375 (P/C 45).
- Partly single track between Singen and Zurich.
- Capacity is limited on the German part of the line.

DE-FR-CH-3: Müllheim – Mulhouse – Basel

As no curve exists on the route from Müllheim to Basel, the deviation route from Müllheim only runs directly to Freiburg. The route from Müllheim to Basel is therefore only feasible with a change of directions.

- Capacity is limited in Germany and between Mulhouse and Basel RB Muttentz.

CH-1: Via Basel SBB passenger station (change direction)

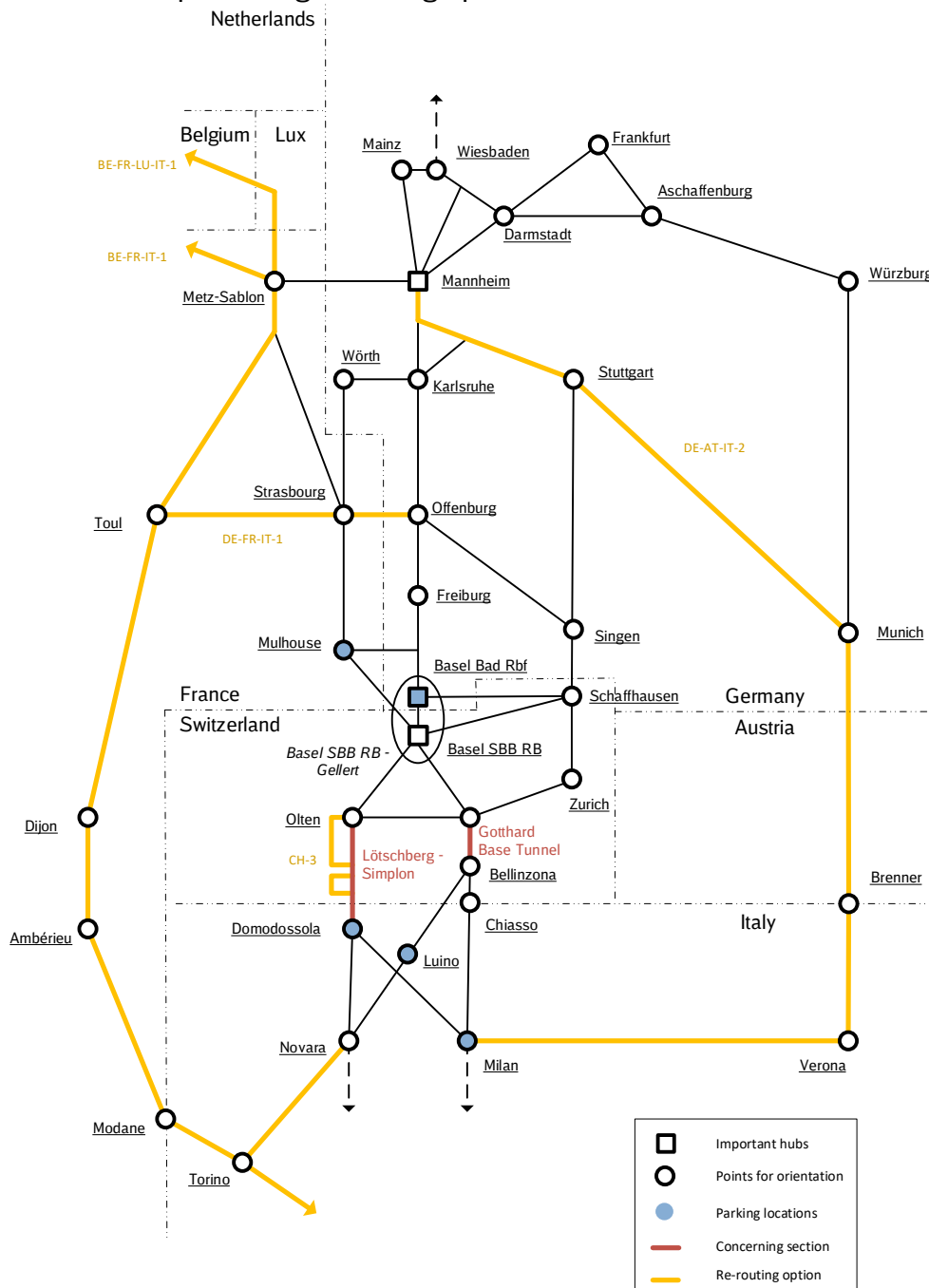
- Change of direction and change of locomotive. Very complicated process.
- Capacity extremely limited.

⁵ In case of an incident in Switzerland trains running north must park at terminals / tracks in Italy. Parking locations in Switzerland itself are very limited.

4.6. Re-routing scenario for section Lötschberg-Simplon and Gotthard

4.6.1. General description

Schematic map including re-routing options.



The Lötschberg-Simplon line and the Gotthard line form two redundant systems in the international railway traffic. If one system is blocked, the other axis takes over – according to the principle of rest capacity. In case of a blocking of Lötschberg base tunnel, the Lötschberg mountain line serves as a direct deviation. The Gotthard mountain line is no longer foreseen for re-routings. The coordination in the border crossing to Italy takes place in close coordination between SBB and RFI. If both axes are blocked at the same time or if available capacity is too little for the traffic, the Brenner-Corridor is used for re-routing. Also re-routing via France (spacious by-pass of the Alpine transit Switzerland) could be an option.

Section ID	Usability	Route
CH-3	Limited	Thun - Kandersteg - Brig (Lötschberg Mountain route)
DE-AT-IT-2	Extremely limited	Mannheim - Stuttgart - Munich - Verona (Brenner / Salzburg) - Milan Smistamento
DE-FR-IT-1	Limited	Offenburg - Strasbourg - Réding - Toul - Dijon - Ambérieu - Modane - Torino - Novara / Alessandria
BE-FR-IT-1	Limited	Antwerp - Mouscron - Lille - Thionville - Metz - Toul - Dijon - Ambérieu - Modane - Torino - Novara / Alessandria
BE-FR-LU- IT-1	Limited	Antwerp - Ronet - Rodange - Bettembourg - Metz - Toul - Dijon - Ambérieu - Modane - Torino - Novara / Alessandria

4.6.2. Parameters of re-routing options including capacity indication

IM	Line section	Usage		Traction power	Train Length	Line category	Number of tracks	Gradient	Gauge	Intermodal freight code	Signalling	Speed	Length of re-routing option	Weight	Miscellaneous	Capacity Indication
		Pass	Frei													
Section: Lötschberg-Simplon and Gotthard																
SBB	Gotthard: Basel SBB RB - Brugg - Altdorf	x	x	AC 15 kV 16,7 Hz	750	D4	2	12‰	EBV 3 includes UIC G1	P/C 80/405	L1LS - 3.4.0	100	114	1600		Limited
SBB	Gotthard Base Tunnel (Altdorf - Bellinzona)	x	x	AC 15 kV 16,7 Hz	750	D4	2	16‰	EBV3 (only base tunnel EBV 4)	P/C 80/405 (only base tunnel P/C 99/429)	L1LS - 3.4.0 (only Base tunnel L2 2.3.0d)	100-120	106	1600		Limited
SBB	Basel - Bellinzona - Luino	x	x	15 kV AC	600m, only some tracks 750m	D4	1	11‰	EBV 3 includes UIC G1	P/C 80/405	L1LS - 3.4.0	100	40	1600	no changing locomotives in Luino, single track in Italy to Milano with extra time in Italy	Limited
SBB	Basel - Olten VL - Thun (->Lötschberg)	x	x	AC 15 kV 16,7 Hz	750	D4	2	20‰	EBV 3 includes UIC G1	P/C 80/405	L1 LS 3.4.0	100	129	22.5 t	Gradient via Burgdorf only 12‰	Limited
BLS	Lötschberg/Simplon: Thun-Spiez-Reichenbach-(LBT)-Brig (Base tunnel)	x	x	AC 15 kV 16,7 Hz	750	D4	2	15‰	EBV 03 includes UIC G1	P/C 80/405	L1LS - 3.4.0 (only Base tunnel L2 2.3.0d)	100	62	1300t (EN) / max 2150t (ZH)		Limited
SBB/RFI	Domodossola II - Brig	x	x	AC 15 kV 16,7 Hz	750	D4	2	25‰	EBV 03 includes UIC G1	P/C 80/405	L1LS - 3.4.0	100	46	700t / max 1450t (ZH)		Limited
CH-3: Thun - Kandersteg - Brig (Lötschberg Mountain route)																
SBB	Basel - Olten VL - Thun (->Lötschberg)	x	x	AC 15 kV 16,7 Hz	750	D4	2	20‰	EBV 3 includes UIC G1	P/C 80/405	L1 LS 3.4.0	100	129	22.5 t	Gradient via Burgdorf only 12‰	Limited
BLS	Lötschberg/Simplon: Thun - Kandersteg - Brig (Mountain route)	x	x	AC 15 kV 16,7 Hz	750	D4	2	27‰	EBV 03 includes UIC G1	P/C 80/405	L1LS - 3.4.0	100	74	700t (EN) / max 1400t (ZH)	Double Track. Partially only one track for P/C 80/405 Additional loco or limited weight	Limited
SBB/RFI	Domodossola II - Brig	x	x	AC 15 kV 16,7 Hz	750	D4	2	25‰	EBV 03 includes UIC G1	P/C 80/405	L1LS - 3.4.0	100	46	700t / max 1450t (ZH)		Limited
DE-AT-IT-2: Mannheim - Stuttgart - Munich - Verona (Brenner/Salzburg) – Milan SM																
DB Netz	(Mannheim - Mühlacker - Ludwigsburg - Kornwestheim - Ulm - Augsburg Hbf -) München - Rosenheim - Kufstein	x	x	AC 15 kV 16,7Hz	600 Standard Train (DB Loco 185)	D4	2	≤ 15‰	Upon request	P/C 80/410	P2B	160	460	With Loco DB 185: Ma-Ku: 2.700 Ku-Ma: 2.530		Good
ÖBB	Kufstein - Wörgl - Hall i. T. - Innsbruck - Brenner	x	x	15 kV 16,7 Hz	600 RFC 3: 600-649	22,5t (8,0t/m) RFC 3: D4	2	0‰-30‰	GA, G1 und G2 RFC 3: GB&G2	P/C 80/410	P2B, ETCS 2 RFC 3: P2B	130 RFC 3: 80-130		700 t (one loco 1216)	Contact ÖBB	
RFI	Brenner – Verona – Milano SM	x	x	3 kV	600	D4L	2	20‰-25‰ for , Brennero - Bivio/P.C. S. Massimo 5‰-10‰ for Verona RFC 6: 6-10‰ for Verona-Milano	upon request	P/C 80/410	BACC/SCMIT	100	371	1600 2500 under specific conditions for incoming trains		Extremely limited
DE-FR-IT-1: Offenburg – Strasbourg – Réding – Toul – Dijon – Ambérieu – Modane – Torino – Novara / Alessandria																
SNCF Réseau	Strasbourg-Offenburg	x	x	25kv AC	750	D4	2	< 12,5‰	GB1	C45	No speed control system	101-120km/h	5	D4		Excellent
SNCF Réseau	Réding - Strasbourg	x	x	25kv AC	750	D4	2	< 12,5‰	GB	C45	KVB	121-160 km/h	68	D4		Limited
SNCF Réseau	Réding - Frouard	x	x	25kv AC	850	D4	2	5-10%	GB1	upon request	KVB	140	92,53	D4	Capacity limited due to various infrastructure works in France	
SNCF Réseau	Frouard - Toul	x	x	25kv AC	850	D4	2	5-10%	GB1	upon request	KVB	140	27,67	D4	Capacity limited due to various infrastructure works in France	
SNCF Réseau	Toul - Is-sur-Tille	x	x	25kv AC	850	D4	2	5-10%	GB1	upon request	KVB	140	191,02	D4	Capacity limited due to various infrastructure works in France	
SNCF Réseau	Is-sur-Tille - Modane/Bardonecchia	x	x	1,5 kv DC	750	D4	2	5-10% / upon request	GB1	upon request	KVB	120	363,42	D4	Capacity limited due to various infrastructure works in France	
RFI	Modane/Bardonecchia - Torino S. Paolo	x	x	3 kv DC	600	D4	2	0-15‰ / 0-30‰	GB1	P/C 45/364	SCMIT	> 100 km/h	89,96	D4		
RFI	Torino S. Paolo - Ponte Tanaro Alessandria	x	x	3 kv DC	525	D4	2	0-5‰ / 10-15‰	A	P/C 32/351	SCMIT	125 / 140 km/h	89,92	D4		Good
RFI	Torino S. Paolo - Novara	x	x	3 kv DC	600	D4	2	10-15‰ / 0-5‰	GB	P/C 80/410	SCMIT	> 100 km/h	98,38	D4		

IM	Line section	Usage		Traction power	Train Length	Line category	Number of tracks	Gradient	Gauge	Intermodal freight code	Signalling	Speed	Length of re-routing option	Weight	Miscellaneous	Capacity Indication
		Pass	Frei													
BE-FR-IT-1: Antwerp – Mouscron – Lille – Thionville – Metz – Toul – Dijon - Ambérieu – Modane – Torino – Novara / Alessandria																
Infrabel	Antwerp - Kortrijk - Mouscron border (France)	x	x	3kv	740	D4	2	N/A	GB	P/C 70/400	TBL1+	100	186,15	1800-2000	no dangerous goods allowed in the Kennedy tunnel in Antwerp Re-routing via Antwerp North and Antigoon Tunnel possible	Limited
SNCF Réseau	Border Belgium – Lille – Longuyon – Thionville - Metz	x	x	25kv AC	750	D4	2 or more	N/A	CB1 (Longuyon – Thionville: 3.3 - C22)	C45 (Longuyon – Thionville: 3.3 - C22)	KVB	120-139		D4		
SNCF Réseau	Metz Sablon - Frouard	x	x	25 kV	850	D4	2	5-10%	GB1	Upon request	KVB	140	47,25	D4	Capacity limited due to various infrastructure works in France	
SNCF Réseau	Réding - Frouard	x	x	25kv AC	850	D4	2	5-10%	GB1	upon request	KVB	140	92,53	D4	Capacity limited due to various infrastructure works in France	
SNCF Réseau	Frouard - Toul	x	x	25kv AC	850	D4	2	5-10%	GB1	upon request	KVB	140	27,67	D4	Capacity limited due to various infrastructure works in France	
SNCF Réseau	Toul - Is-sur-Tille	x	x	25kv AC	850	D4	2	5-10%	GB1	upon request	KVB	140	191,02	D4	Capacity limited due to various infrastructure works in France	
SNCF Réseau	Is-sur-Tille - Modane/Bardonecchia	x	x	1,5 kv DC	750	D4	2	5-10% / upon request	GB1	upon request	KVB	120	363,42	D4	Capacity limited due to various infrastructure works in France	
RFI	Modane/Bardonecchia - Torino S. Paolo	x	x	3 kv DC	600	D4	2	0-15‰ / 0-30‰	GB1	P/C 45/364	SCMIT	> 100 km/h	89,96	D4		
RFI	Torino S. Paolo - Ponte Tanaro Alessandria	x	x	3 kv DC	525	D4	2	0-5‰ / 10-15‰	A	P/C 32/351	SCMIT	125 / 140 km/h	89,92	D4		Good
RFI	Torino S. Paolo - Novara	x	x	3 kv DC	600	D4	2	10-15‰ / 0-5‰	GB	P/C 80/410	SCMIT	> 100 km/h	98,38	D4		
BE-FR-LU-IT-1: Antwerp – Ronet – Rodange – Bettembourg – Metz – Toul – Dijon - Ambérieu – Modane – Torino – Novara / Alessandria																
Infrabel	Antwerp - Ronet - Aubange (border LUX)	x	x	3kv	740	D4	2	N/A	GB	PC 70/400	ETCS L1 FS TBL1+	100	283	N-S: 1200 (Diesel), 1600 (Electric) S-N: 900 (Diesel), 1400 (Electric)	Between Antwerpen Luchtbal and Lier = comprehensive network no dangerous goods allowed in the Kennedy tunnel in Antwerp Re-routing via Antwerp North and Antigoon Tunnel possible	Limited
CFL	Rodange - Esch-sur-Alsette - Bettembourg		x	25 kV	750	D4	2	≤ 19‰	GB - C50	Upon request	ETCS Level 1	90		D4		Limited
SNCF Réseau	LUX border - Metz-Sablon	x	x	25 kv	850	D4	2	5-10%	GB1	Upon request	ETCS L1, KVB	140	51,8	D4	Capacity limited due to various infrastructure works in France	limited
SNCF Réseau	Metz Sablon - Frouard	x	x	25 kV	850	D4	2	5-10%	GB1	Upon request	KVB	140	47,25	D4	Capacity limited due to various infrastructure works in France	
SNCF Réseau	Réding - Frouard	x	x	25kv AC	850	D4	2	5-10%	GB1	upon request	KVB	140	92,53	D4	Capacity limited due to various infrastructure works in France	
SNCF Réseau	Frouard - Toul	x	x	25kv AC	850	D4	2	5-10%	GB1	upon request	KVB	140	27,67	D4	Capacity limited due to various infrastructure works in France	
SNCF Réseau	Toul - Is-sur-Tille	x	x	25kv AC	850	D4	2	5-10%	GB1	upon request	KVB	140	191,02	D4	Capacity limited due to various infrastructure works in France	
SNCF Réseau	Is-sur-Tille - Modane/Bardonecchia	x	x	1,5 kv DC	750	D4	2	5-10% / upon request	GB1	upon request	KVB	120	363,42	D4	Capacity limited due to various infrastructure works in France	
RFI	Modane/Bardonecchia - Torino S. Paolo	x	x	3 kv DC	600	D4	2	0-15‰ / 0-30‰	GB1	P/C 45/364	SCMIT	> 100 km/h	89,96	D4		
RFI	Torino S. Paolo - Ponte Tanaro Alessandria	x	x	3 kv DC	525	D4	2	0-5‰ / 10-15‰	A	P/C 32/351	SCMIT	125 / 140 km/h	89,92	D4		Good
RFI	Torino S. Paolo - Novara	x	x	3 kv DC	600	D4	2	10-15‰ / 0-5‰	GB	P/C 80/410	SCMIT	> 100 km/h	98,38	D4		

4.6.3. Parking locations & capacity

Country	Location	Number of tracks	Maximum train length	Restrictions
Germany	Basel Bad. Bf	5	max. 650 meters	capacity very limited
France	Mulhouse	5	max. 750 meters	
Switzerland ⁶	Basel SBB RB	4	max. 650 meters	
Italy	Domodossola/Domo Il	38	max. 650 meters	only 12 tracks multipower (3 kVv /15 kV)
Italy	Luino	5	max. 650 meters	
Italy	Novara Boschetto	16	max. 950 meters	
Italy	Gallarate	3	max. 580 meters	
Italy	Melzo Scalo	3	max. 850 meters	
Italy	Brescia Scalo	5	max. 680 meters	
Italy	Milan Smistamento	22	max. 1.000 meters	

4.6.4. Restrictions

Each re-routing option can have specific restrictions which are commented here.

CH-3: Thun - Kandersteg - Brig (Lötschberg Mountain route)

On the Lötschberg route between Frutigen and Brig additional re-routing is possible via the mountain route under specific conditions:

- Limited weight or additional locomotive necessary.
- Partially only one track for P/C 80/405.
- Limited capacity on the whole line.

DE-AT-IT-2: Mannheim - Stuttgart - Munich - Verona (Brenner / Salzburg) - Milan Smistamento

- Capacity limitations between Stuttgart – Munich because of many passenger trains.
- 40% less capacity then on main corridor.
- Weight limitations on Brenner route.
- Extremely limited capacity between Brenner and Milano Smistamento.

⁶ In case of an incident in Switzerland trains running north must park at terminals / tracks in Italy. Parking locations in Switzerland itself are very limited.

DE-FR-IT-1: Offenbourg - Strasbourg - Réding - Toul - Dijon - Ambérieu - Modane - Torino - Novara / Alessandria

- Capacity restrictions may occur between Nancy and Strasbourg, especially in the area of Réding. Also, various infrastructure works in France may limit capacity.

BE-FR-IT-1: Antwerp - Mouscron - Lille - Thionville - Metz - Toul - Dijon - Ambérieu - Modane - Torino - Novara / Alessandria

- Various infrastructure works in France may limit capacity.
- Limited capacity in Belgium.
- No dangerous goods allowed in the Kennedy tunnel in Antwerp. Freight trains with dangerous goods will have a deviation route via Antwerp North and the Antigoon tunnel (Liefkenshoek Rail link). Extra travel time is 15 minutes.

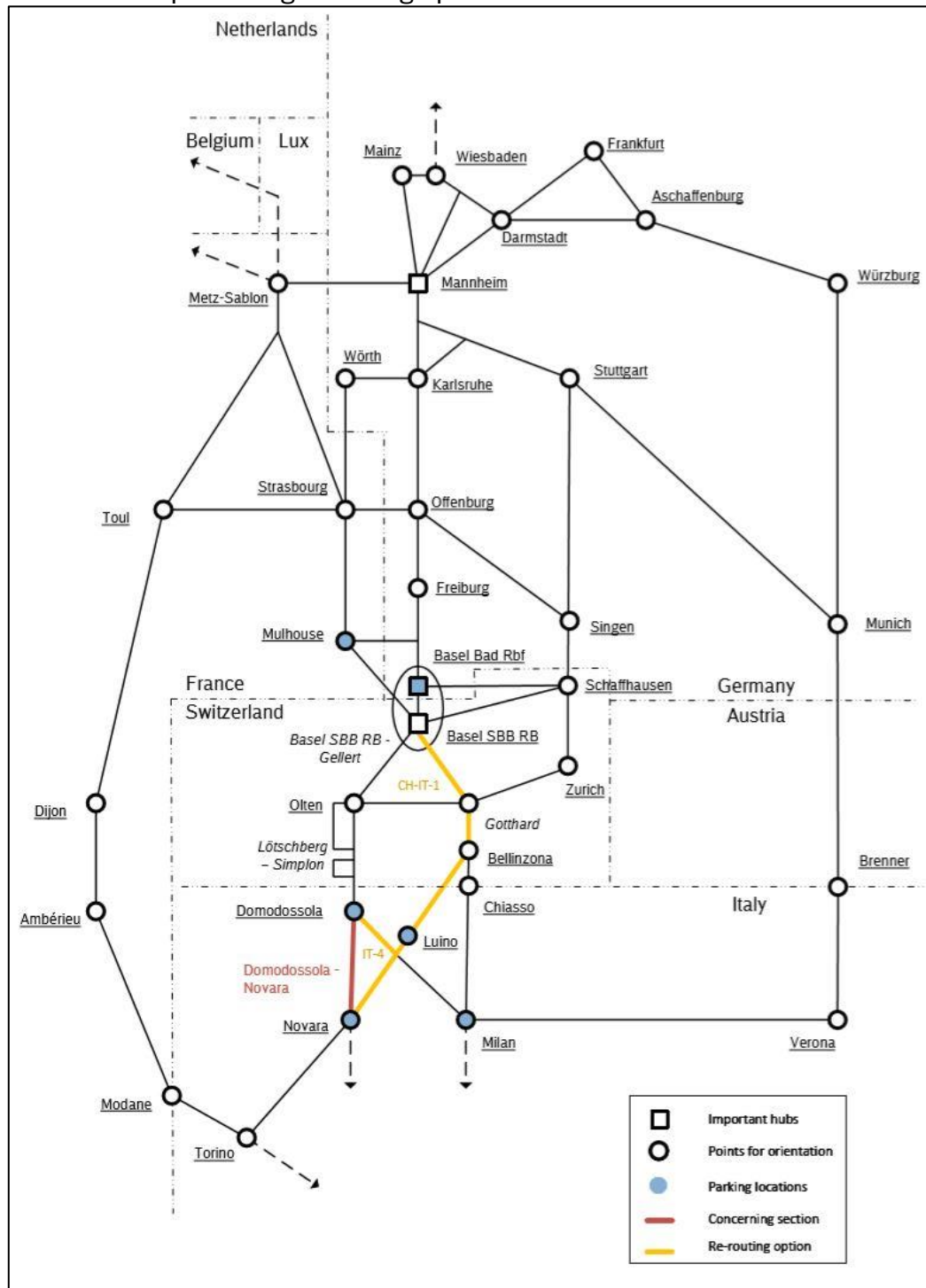
BE-FR-LU-IT-1: Antwerp - Ronet - Rodange - Bettembourg - Metz - Toul - Dijon - Ambérieu - Modane - Torino - Novara / Alessandria

- Various infrastructure works in France may limit capacity.
- Capacity is limited in Belgium.
- No dangerous goods allowed in the Kennedy tunnel in Antwerp. Freight trains with dangerous goods will have a deviation route via Antwerp North and the Antigoon tunnel (Liefkenshoek Rail link). Extra travel time is 15 minutes.
- Capacity is limited on the CFL parts of the line.

4.7. Re-routing scenario for section Domodossola – Novara

4.7.1. General description

Schematic map including re-routing options.



There is no re-routing option for high profile traffic. When this route is blocked the re-routing options are:

Section ID	Usability	Route
CH-IT-1	B	Basel - Gotthard - Bellinzona - Novara
IT-4	B	Domodossola - Arona - Novara

4.7.2. Parameters of re-routing options including capacity indication

IM	Line section	Usage		Traction power	Train Length	Line category	Number of tracks	Gradient	Gauge	Intermodal freight code	Signalling	Speed	Length of re-routing option	Weight	Miscellaneous	Capacity Indication
		Pass	Frei													
Section: Domodossola - Novara																
RFI	Domodossola - Borgomanero - Novara - Rho - Milano Rogoredo	x	x	3 KV	575	D4L	2	N/A	upon request	P/C80	SCMT	80	146	1600	Domodossola - Borgonamero - Vignale single track . Double the others lines	Extremely limited
CH-IT-1: Basel – Gotthard – Bellinzona – Novara																
SBB	Gotthard: Basel SBB RB - Brugg - Altdorf	x	x	AC 15 kV 16,7 Hz	750	D4	2	12‰	EBV 3 includes UIC G1	P/C 80/405	L1L5 - 3.4.0	100	114	1600		Limited
SBB	Gotthard Base Tunnel (Altdorf - Bellinzona)	x	x	AC 15 kV 16,7 Hz	750	D4	2	16‰	EBV3 (only base tunnel EBV 4)	P/C 80/405 (only base tunnel P/C 99/429)	L1L5 - 3.4.0 (only Base tunnel L2 2.3.0d)	100-120	106	1600		Limited
SBB	Basel - Bellinzona - Luino	x	x	15 kV AC	600m, only some tracks 750m	D4	1	11‰	EBV 3 includes UIC G1	P/C 80/405	L1L5 - 3.4.0	100	40	1600	no changing locomotives in Luino, single track in Italy to Milano with extra time in Italy	Limited
RFI	Luino - Laveno - Sesto Calende - Vignale - Novara	x	x	3 KV	540	D4L	2	N/A	upon request	P/C50	SCMT	100	68	1600	Luino - Laveno - Vignale single track. Double the other sections	Limited
IT-4: Domodossola – Arona – Novara																
RFI	Domodossola - Arona - Novara	x	x	3 KV	510/540	D4L	2 (1:Arona-Vignale and Bivio Toce-Bivio Vallee via Domo 2)	N/A	upon request	P/C45	SCMT	100	96	1600		Limited

4.7.3. Parking locations & capacity

Country	Location	Number of tracks	Maximum train length	Restrictions
Germany	Basel Bad. Bf	5	max. 650 meters	capacity very limited
France	Mulhouse	5	max. 750 meters	
Switzerland ⁷	Basel SBB RB	4	max. 650 meters	
Italy	Domodossola/Domo Il	38	max. 650 meters	only 12 tracks multipower (3 kV/15 kV)
Italy	Luino	5	max. 650 meters	
Italy	Novara Boschetto	16	max. 950 meters	
Italy	Gallarate	3	max. 580 meters	
Italy	Melzo Scalo	3	max. 850 meters	
Italy	Brescia Scalo	5	max. 680 meters	
Italy	Milan Smistamento	22	max. 1.000 meters	

4.7.4. Restrictions

Each re-routing option can have specific restrictions which are commented here.

A re-routing option does not exist for high profile traffic like rolling highway.

CH-IT-1: Basel - Gotthard - Bellinzona - Novara

The re-routing option passes through the Gotthard base tunnel.

- Capacity is limited on the complete line.
- No locomotive changes in Luino. Single track in Italy towards Milano.

IT-4: Domodossola - Arona - Novara

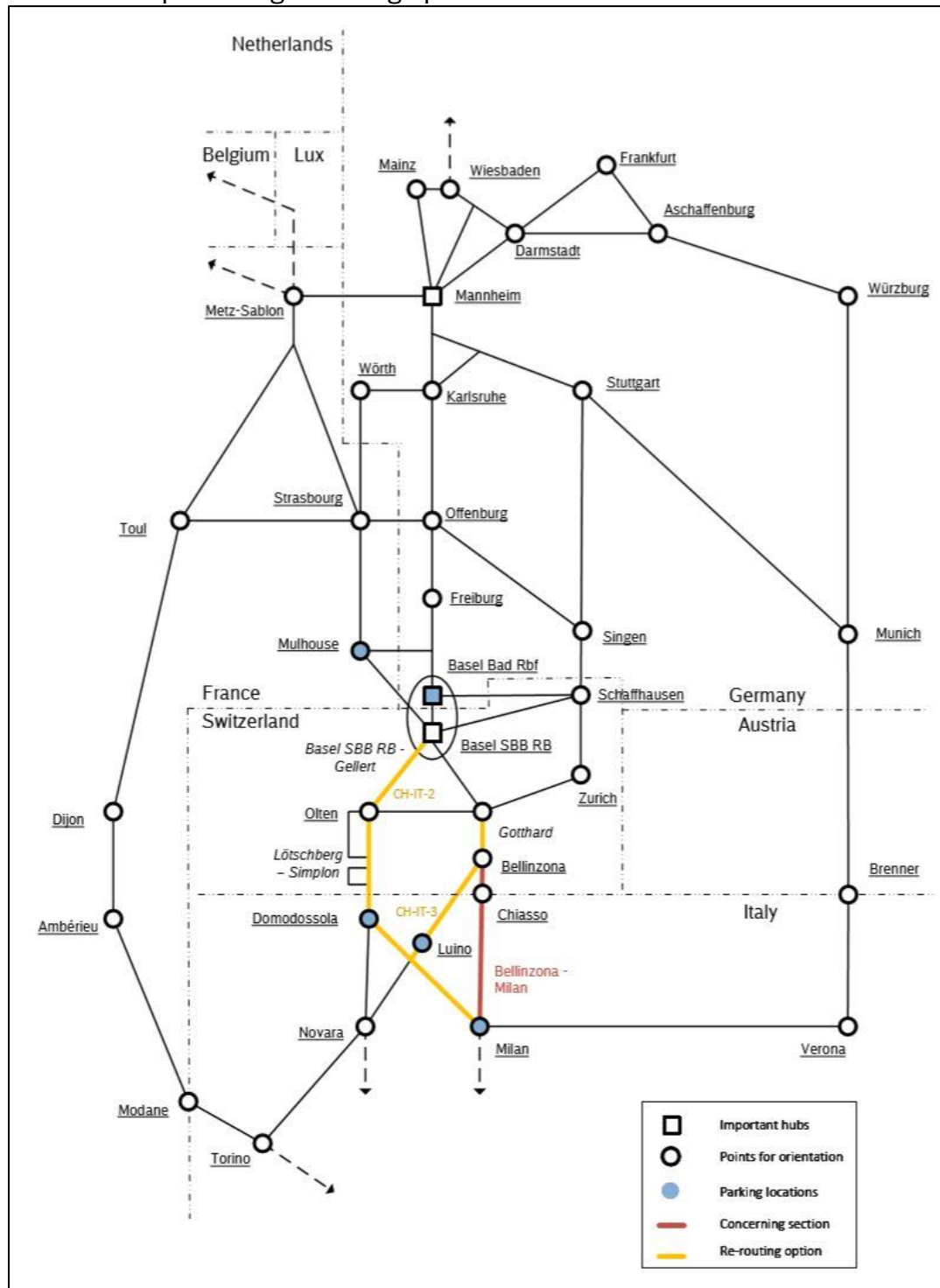
- Gauge restrictions: P/C45..
- Capacity is limited on the whole line.

⁷ In case of an incident in Switzerland trains running north must park at terminals / tracks in Italy. Parking locations in Switzerland itself are very limited.

4.8. Re-routing scenario for section Bellinzona – Milan

4.8.1. General description

Schematic map including re-routing options.



In case a disruption occurs either in Ceneri base tunnel or on Ceneri mountain line, the other line can take over parts of trains. Specific infrastructure standards need to be respected.

When this route is blocked the re-routing options are:

Section ID	Usability	Route
CH-IT-2	B	Basel - Domodossola - Milan
CH-IT-3	B	Bellinzona - Gallarate - Milan

4.8.2. Parameters of re-routing options including capacity indication

IM	Line section	Usage		Traction power	Train Length	Line category	Number of tracks	Gradient	Gauge	Intermodal freight code	Signalling	Speed	Length of re-routing option	Weight	Miscellaneous	Capacity indication
		Pass	Frei													
Section: Bellinzona - Milano																
SBB	Bellinzona - Chiasso (via Ceneri mountain route)	x	x	AC 15 kV 16,7 Hz	650 (750m only in case of re-routing)	D4	2	26‰	EBV 1, includes UIC G1	P/C 60/384 - P/C 80/405 in 2021	L1LS - 3.4.0 (accessible only with L2 2.3.0d)	100	55	N-S: 1300t one loco, 1600t two locos S-N: 830t one loco, 1650t two locos		Limited
SBB	Bellinzona - Chiasso (via Ceneri Base tunnel)	core network	x	x	AC 15 kV 16,7 Hz	650 - 750 in 07/2021	D4	2	12.5‰	EBV 3, includes UIC G1 (only base tunnel EBV4)	P/C 80/405 (only base tunnel P/C 99/429)	L2 2.3.0d	100-160	50	N-S: 1300t one loco, 1600t two locos, from 2021: 2150t two locos	
RFI	Chiasso - Milano Certosa - Rho - Novara	x	x	3 kV	575 (450 Chiasso -Bivio Rosales via Albate Camerlata)	D4L	2	N/A	upon request	P/C60; (P/C/22 Chiasso -Bivio Rosales via Albate Camerlata)	SCMT	100	108	1600		Extremely limited
CH-IT-2: Basel – Domodossola – Milano																
SBB	Basel - Olten VL - Thun (->Lötschberg)	x	x	AC 15 kV 16,7 Hz	750	D4	2	20‰	EBV 3 includes UIC G1	P/C 80/405	L1 LS 3.4.0	100	129	22.5 t	Gradient via Burgdorf only 12‰	Limited
BLS	Lötschberg/Simplon: Thun-Spiez-Reichenbach-(LBT)-Brig (Base tunnel)	x	x	AC 15 kV 16,7 Hz	750	D4	2	15‰	EBV 03 includes UIC G1	P/C 80/405	L1LS - 3.4.0 (only Base tunnel L2 2.3.0d)	100	62	1300t (EN) / max 2150t (ZH)		Limited
BLS	Lötschberg/Simplon: Thun - Kandersteg - Brig (Mountain route)	x	x	AC 15 kV 16,7 Hz	750	D4	2	27‰	EBV 03 includes UIC G1	P/C 80/405	L1LS - 3.4.0	100	74	700t (EN) / max 1400t (ZH)	Double Track. Partially only one track for P/C 80/405	Limited
SBB/RFI	Domodossola II - Brig	x	x	AC 15 kV 16,7 Hz	750	D4	2	25‰	EBV 03 includes UIC G1	P/C 80/405	L1LS - 3.4.0	100	46	700t / max 1450t (ZH)		Limited
RFI	Domodossola - Arona - Sesto Calende - Gallarate - Milano Rogoredo	x	x	3 kV	600 (there are some exception in Rho and Milan area: 550-450m)	D4L	2	N/A	upon request	P/C45	SCMT	100	130	1600		Extremely limited
CH-IT-3: Bellinzona – Gallarate - Milano																
SBB	Basel - Bellinzona - Luino	x	x	15 kV AC	600m, only some tracks 750m	D4	1	11‰	EBV 3 includes UIC G1	P/C 80/405	L1LS - 3.4.0	100	40	1600	no changing locomotives in Luino, single track in Italy to Milano with extra time in Italy	Limited
RFI	Luino- Gallarate - Rho - Milano Rogoredo	x	x	3 kV	600	D4L	2	N/A	upon request	P/C45	SCMT	100	95	1600	Luino - Gallarate single track. Double the others lines	Extremely limited

4.8.3. Parking locations & capacity

Country	Location	Number of tracks	Maximum train length	Restrictions
Germany	Basel Bad. Bf	5	max. 650 meters	capacity very limited
France	Mulhouse	5	max. 750 meters	
Italy	Domodossola/Domo II	38	max. 650 meters	only 12 tracks multipower (3 kV/15 kV)
Italy	Luino	5	max. 650 meters	
Italy	Novara Boschetto	16	max. 950 meters	
Italy	Gallarate	3	max. 580 meters	
Italy	Melzo Scalo	3	max. 850 meters	
Italy	Brescia Scalo	5	max. 680 meters	
Italy	Milan Smistamento	22	max. 1.000 meters	
Switzerland	Basel SBB RB	4	max. 650 meters	

In case of an incident in Switzerland trains running north must park at terminals / tracks in Italy. Parking locations in Switzerland itself are very limited.

4.8.4. Restrictions

Each re-routing option can have specific restrictions which are commented here.

CH-IT-2: Basel – Domodossola – Milan

The signalling of the Swiss network is ETCS L1LS - 3.4.0 and partly L2 SRS 2.3.0d including the border sections to the stations Domodossola and Luino which are already part of the Italian network. The residual lines in northern Italy are equipped with SCMT, ETCS L1 FS (Radio Infill).

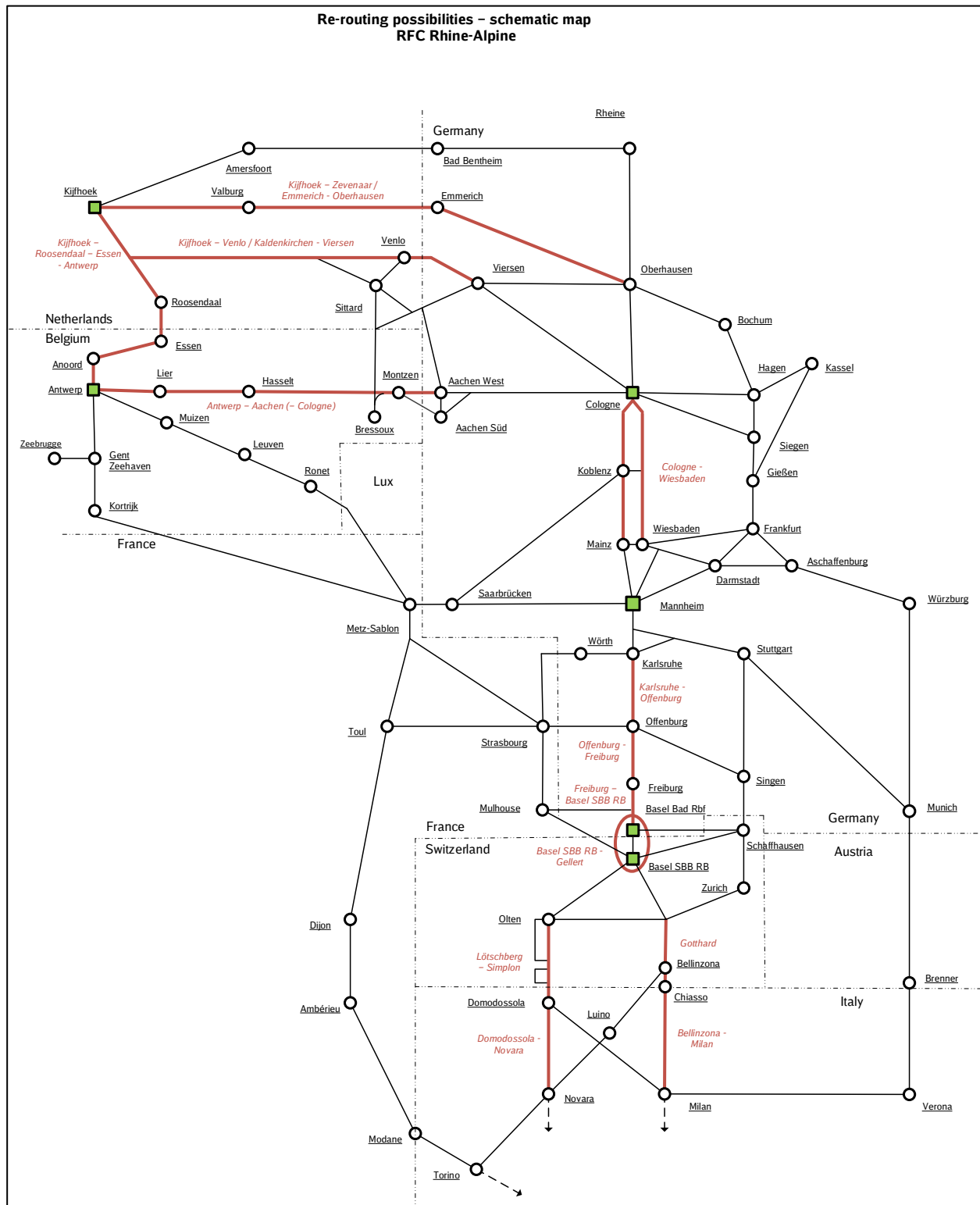
- maximum train length is 600 meters.
- profile limitation is P/C45.
- Max. train weight is 700t.
- The capacity is limited on the whole line and extremely limited between Domodossola and Milano Rogoredo.

CH-IT-3: Bellinzona – Gallarate – Milan

- The section between Luino – Gallarate is a single-track line.
- The profile P/C45 does not allow high profile traffic like rolling highway.
- Maximum train length is 600 meters.
- Capacity is limited in Switzerland and extremely limited in Italy.
- No locomotive changes in Luino.

Annex 1

Overview map of re-routing scenarios for RFC Rhine-Alpine



Annex 2

Overview of re-routing scenarios on RFC Rhine-Alpine with routing

Section ID	Route
BE-FR-1	Antwerp - Kortrijk - FR
BE-FR-IT-1	Antwerp - Mouscron - Lille - Thionville - Metz - Toul - Dijon - Ambérieu - Modane - Torino - Novara / Alessandria
BE-FR-LU-IT-1	Antwerp - Ronet - Rodange - Bettembourg - Metz - Toul - Dijon - Ambérieu - Modane - Torino - Novara / Alessandria
BE-LU-FR-1	Antwerp - Luxemburg - FR
BE-NL-DE-1	Antwerp - Roosendaal / Essen - Kijfhoek - Emmerich - Oberhausen
BE-NL-DE-2	Antwerp - Roosendaal / Essen - Venlo / Kaldenkirchen - Viersen
BE-NL-DE-3	Antwerp - Roosendaal / Essen - Maastrich / Visé - Bressoux - Aachen West
CH-1	Via Basel SBB passenger station (change of direction) ¹
CH-3	Thun - Kandersteg - Brig (Lötschberg Mountain route)
CH-IT-1	Basel - Gotthard - Bellinzona - Novara
CH-IT-2	Basel - Domodossola - Milan
CH-IT-3	Bellinzona - Gallarate - Milan
DE-3.1	Frankfurt - Gießen - Siegen - Cologne
DE-3.2	Frankfurt - Gießen - Kassel - Dortmund - Cologne
DE-3.3	Mannheim - Saarbrücken - Trier - Koblenz - Cologne
DE-3.4	Frankfurt - Gießen - Siegen - Hagen - Oberhausen
DE-AT-IT-2	Mannheim - Stuttgart - Munich - Verona (Brenner / Salzburg) - Milan Smistamento
DE-AT-IT-3	Wiesbaden - Frankfurt - Aschaffenburg - Würzburg - Munich - Verona (Brenner / Salzburg) - Milan Smistamento
DE-CH-2	Mannheim - Stuttgart - Singen - Zurich
DE-CH-3	Offenburg - Singen - Zurich
DE-FR -1 (b2)	Karlsruhe - Wörth - Strasbourg - Basel (b1) / Offenburg (b2)
DE-FR-2 (d2)	Mannheim - Metz - Strasbourg - Basel (d1) / Offenburg (d2)
DE-FR-CH-1 (b1)	Karlsruhe - Wörth - Strasbourg - Basel (b1) / Offenburg (b2)
DE-FR-CH-2 (d1)	Mannheim - Metz - Strasbourg - Basel (d1) / Offenburg (d2)
DE-FR-CH-3	Müllheim - Mulhouse - Basel
DE-FR-IT-1	Offenburg - Strasbourg - Réding - Toul - Dijon - Ambérieu - Modane - Torino - Novara / Alessandria
IT-4	Domodossola - Arona - Novara
NL-BE-DE-1	Kijfhoek - Roosendaal / Essen - Aachen West - Cologne
NL-BE-DE-2	Kijfhoek - Sittard - Maastricht / Visé - Bressoux - Aachen West
NL-BE-DE-3	Cologne - Aachen Rothe Erde - Aachen Süd - Hergenrath - Montzen - Roosendaal - Kijfhoek
NL-BE-FR-1	Kijfhoek - Roosendaal / Essen - Antwerp - Kortrijk - FR
BE-LU-FR-1	Antwerp - Luxemburg - FR

NL-BE-LU-FR-CH-1	Rotterdam / Antwerp - Belgium - Luxembourg - France - Basel
NL-DE-1	Kijfhoek - Zevenaar / Emmerich - Oberhausen
NL-DE-2	Kijfhoek - Venlo / Kaldenkirchen - Viersen
NL-DE-3	Kijfhoek - Oldenzaal / Bad Bentheim - Rheine